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CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information

EDITORIAL ANNOUNCEMENTS.

of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

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FRIDAY, DECEMBER 1, 1905.

A committee of the Roadmasters' Association recently defined a tie plate as "a rolled steel plate having thin flanges on the under side, which, when embedded in a tie under the rail seat, has sufficient adhesion to cause it to act with and become practically an integral part of the tie." In enumerating the classes of tie plates, three kinds were mentioned: non-adhesive, longitudinal flange and cross-grain claw. The first, however, is really ignored in the definition for the declared reason that it "cannot perform the first requirement essential to a tie plate, which is to become a part of and act with the tie under passing loads." The foregoing is of interest in connection with the practice just adopted by the Union Pacific. After long experience with the flange-bottom plates, their use has been abandoned for the reasons that (1) it is almost impossible to get the men to embed them in the ties properly, and (2) with treated ties especially, the holes they cut in the wood allow the water to penetrate readily at these points, causing decay there long before the remainder of the tie shows signs of deterioration. Because of these difficulties, a flat-bottom plate has been used altogether in the new double-track between Kansas City and Topeka. Also, the size of the plate has been materially increased to give greater bearing area. The plates used in the past, which correspond to general practice, have been too small and have crushed into the timber; in fact, in many cases they crushed in so far that the rail also cut the ties. The new type used, which is as long as the tie is wide, weighs about $6\frac{1}{2}$ lbs. and costs the road about 13 cents. In adopting the flat-bottom plate the Union Pacific is merely going back to first principles, as the earliest forms of tie plates were of this type. The chief objection urged against this type is that as soon as the rail becomes slightly loosened, as it does under the wave movement due to the rolling loads, the plate likewise is loosened and abrades the tie surface in much the same way that the rail would. However, some roads have continued to prefer the flat-bottom type, notably the Southern Pacific, which was a pioneer in the use of tie plates and has adhered consistently to the flat-bottom shoulder plate from the beginning, modifying the design as experience and increased weight of rolling stock dictated. The South Side Elevated Road, Chicago, found the same objection to the flange-bottom plate, as the Union Pacific, in regard to its instrumentality in causing local decay, and besides adopting a flat-bottom plate, uses a screw spike to avoid the driven-spike evils. A chief engineer of a railroad, after a careful study of the tie plate question two or three years ago, said that any tie plate

will penetrate the tie sooner or later; and, furthermore, that a plate cannot be prevented from moving on the tie when a train is passing and that its teeth or lugs or flanges thus widen the space they occupy, admitting foreign material and promoting decay. Both of these points are borne out in the experiences above cited.

Rail motor cars, which were attracting the closest attention in England last year, have turned the corner of their popularity in that country just as the first experimental uses are being made of them here. In October, 1904, the Swindon works of the Great Western Railway (England) were turning out upright-boiler steam motor cars as fast as it could be conveniently done. At the present time this construction has almost entirely ceased on the Great Western, and the economies of this type of car are being seriously questioned. The primary objection to all steam motor cars in England, constituting a very large proportion of the total number of rail motor cars in use, is that they require three men to work them and show no apparent economy over the light locomotive coupled to a single car with an arrangement by which driving can be done from either end, while the first cost of these steam cars—which is approximately \$10,000—brings in no return that could not be had by the use of old and light stock remodeled for the service at small cost. Petrol cars in England are being investigated with great interest this year. The type in which the petrol engine drives a dynamo, thereby avoiding the difficulties of the starting strain, have been only partially successful, and have been rather expensive, the North Eastern cars of this type costing approximately \$15,000 each. Straight petrol cars, to use the English term, are also being tried; as on the London, Brighton & South Coast between Eastbourne and St. Leonards, on the Channel coast. A month ago two cars were in use on this service; one a steam car similar in general design to the Great Western type; the other a straight gasoline or petrol car. The seating capacity of the two cars was about the same, but the seats were crowded into a considerably shorter car body in the petrol car. The latter had some difficulty in starting, and, as with an ordinary road automobile, the gears and the clutches occasionally made trouble in getting from the lower to the higher speeds. But after the car was well under way it ran on a level track with great smoothness at a speed of forty or fifty miles an hour, while the steam motor car, which had no difficulty in starting or stopping properly, was apparently not capable of exceeding about thirty miles an hour on the same

stretch of track. It is no exaggeration to say that the best English opinion at the present time holds that, taking into consideration interest on first cost and allowing for the wages of the third man, a small locomotive, retired from regular service, can be equipped with a single car to work a branch line cheaper than the line can be worked with a rail motor car. As Mr. Forney has pointed out in these columns in past years, it is a distinct advantage to have a car and engine capable of being separated when it is desirable to repair or renovate either one of them while keeping the other one in service. So far as we know, only two roads in this country have so far actually built rail motor cars for present day service, the Union Pacific and the Delaware & Hudson; and neither of these roads has as yet put its cars into what might be called regular, as distinct from experimental, use. The higher wages prevalent in this country make the use of a gasoline car, and the consequent reduction in crew from three men to two men, more important here than it is in England.

RAILROAD LEGISLATION LITERATURE.

"Surely every medicine is an innovation, and he that will not apply new remedies must expect new evils."—*Lord Bacon, A. D. 1625.*

The rate regulation question is not one that lends itself to the production of election literature. It is too intricate a problem to interest deeply the ordinary citizen, and the leaders interested have so far failed to devise any abiding catch-words to be taken up by unquestioning voters. From circles where the problem is seriously examined from economic standpoints two most interesting contributions have recently appeared, one from an experienced railroad officer, Mr. Henry S. Haines, and another from a profound student, Professor Meyer.* It was perhaps not to be expected that any new light would be thrown upon the much debated subject by these two authorities. The question has long since been worn threadbare, even in its less obvious aspects, and neither of the two new books brings forward any constructive schemes for a solution of the problem. That the day is not far distant when academic theses must give way to concrete suggestions becomes more evident each week. The railroads have, so far, apparently failed to grasp that situation. It may appear to them better policy to wait until the government scheme has been formulated, and then, obeying the law, let the disastrous results prove to the communities which they serve that their interests are by so much identical with those of their railroad. This will be costly to both; but the problem has now passed the "Regulation or No-Regulation Stage." It is now a case of what shall be the minimum degree of additional regulation which the railroads need in order to serve the public best. As Mr. Haines lucidly puts it, "The several so-called railroad problems are reducible to one basic problem, viz., the efficient regulation of the management and operation of the national railroad system in matters affecting the public welfare." In another passage he states the matter still more clearly. "It is," he says, "no longer a question of the regulation of railroad rates, but of the regulation of the manner in which property rights are to be applied to a public service; and under our form of constitutional government this, it seems, can only be accomplished by the regulation of corporate powers in general."

Throughout his book, Mr. Haines maintains a strictly impartial attitude toward the two great forces at work in the controversy, the railroads and the people. He deals with matters in their true light, takes men as they are, and the railroads as he finds them. Judicially he examines the *pros* and *cons* of American methods of railroad finance, operation, rate-adjustment, etc., and while his opinions are more frequently suggested than specified, he shows a remarkable capacity to "see things clearly and to see them whole." To him a railroad is not merely a preserve for its stockholders, nor is it prey for the general public; it is a necessary adjunct to the social and commercial life of the commonwealth, and while it has its privileges, it has likewise its responsibilities, and its obligations to the State. Rate-regulation is not a question of dividends; it goes deeper than that. Will the public weal be advanced if the rate-making powers of the railroads are further restricted by the State? If so, then it is for the people to say what shall be the nature and extent of the restriction. It is useless to claim that the people have no right to answer that question. They have, even though they do not exercise it, and by giving an earnest of their desires to promote a satisfactory solution of the problem, one which does not do violence to their corporate rights, the railroads will not only be advancing their interests, they will be serving the State. "The path of social evolution

is not in a circle," says Mr. Haines, "for the previous conditions can never be restored. It advances along a spiral course from one plane of environment to another. Selfishness tends to restrain it upon the lower plane."

Turning from Mr. Haines' book, which we cannot help describing as a masterly review of the economics of restrictive railroad legislation, to Professor Meyer's study of "Government Regulation of Railway Rates," we deeply regret that the learned professor should have approached his subject with such unmistakable evidences of partisanship and bias. We sincerely wish that Mr. Meyer, whose name carries authority and whose position commands respect, had seen fit to take into account the case of the advocates of drastic legislation before pronouncing judgment. We are certain he would not have modified his conclusions materially, for all the justice of the case which he examines is on his side, but he would have made his book less offensive to readers in the other camp, and he might thus have won some of them over to his views. Mr. Meyer's attitude in this respect is the more unfortunate in that his book is, in large measure, only indirectly concerned with the question at issue. It is primarily an exposition of the evils attending the State ownership of railroads. As such, it is without doubt the best book of its kind which has come to our notice. Mr. Meyer is an authority on the subject, and he makes a strong case against the principle of State ownership. He has closely studied every phase of the situation, both in Europe and in Australia, and there are few who will quarrel with his conclusions. When he turns to the subject of rate-regulation in the United States, however, we think he is unduly indifferent to the tenor of public opinion. As we have already said, the day is past when the academic aspects of the question may be profitably discussed. Matters have reached a stage where it behooves those concerned to make some definite attempt to grapple with a situation which is forcing itself upon them. Restrictive legislation by the people, however objectionable, may divert, but it cannot stem the tide of progress. And, as the author of "Restrictive Railway Legislation" points out, "Nothing definitive can be accomplished by hasty and impatient legislation. It will all come to naught in the clear, cold light of the Supreme Court." We notice that Professor Meyer makes use of every opportunity of attacking the Interstate Commerce Commission. That august body has undeniably shown an incapacity to grasp a situation in all its bearings, and is, in its present form, incompetent to assume rate-making and rate-breaking duties. But does any one seriously propose to invest the Commission, as at present constituted, with these powers? "Political demoralization and industrial chaos" would ensue, declares Professor Meyer. Here is the railroads' opportunity; can they not suggest the form of a tribunal to which they would be glad to submit rate difficulties for solution? It is time that some definite effort, with some such end in view, was made. The people will soon be declaring their opinion with no uncertain voice.

THE FORAKER BILL.

An examination of the Foraker bill, which is printed in full in this week's paper, suggests that it is at once the best and the worst of the measures which have been introduced with a view to preventing discrimination between shippers. Its merit lies in the fact that it is aimed squarely at the real issue—the prevention of discrimination—and does not become involved in the hopeless muddle of the Esch-Townsend legislation to which the House of Representatives committed itself so readily last spring. The chief evil of the Foraker bill, as we see it, is in the fact that it relies for its sole weapon of effectiveness on the use of the injunction. A secondary defect, which is nevertheless of great importance, is that the author throws a most unmistakable sop to the ship subsidy vote by his absurd inclusion of special discriminations (in an anti-discrimination measure) to be given to American ships, after laying down a general scheme for import and export traffic that is intolerable in its conditions to all who ship in foreign bottoms.

There is one, and only one, basic principle, in rate making and rate charging, on which all leading men agree, and this is that the railroads must treat all customers alike, and without discrimination. The President and the great railroad officers believe that it is the duty of government to enforce this principle, and the tests to be applied to each one of the bills presented to Congress are: Does it in any way violate this principle? Is it a workable method of securing the result aimed at? Senator Foraker's bill is essentially vicious in that it aims to prevent discrimination in some things and legalizes discrimination in others. Non-discrimination means not only that one railroad must treat all of its customers alike, but,

*"Restrictive Railway Legislation" by Henry S. Haines. \$1.25. "Government Regulation of Railway Rates," by Hugo Richard Meyer. \$1.50. New York: The Macmillan Company, 1905.

more broadly, that railroads, as a whole, must not be allowed to discriminate against localities—the rates and classifications must be reasonable and defensible.

The portion of the bill which specially authorizes the Interstate Commerce Commission to investigate the transactions of common carriers under its own initiative is thoroughly good. After providing for this feature the bill at once concerns itself with discriminations, and provides that the Interstate Commerce Commission on its own motion may prosecute all such cases before any United States Circuit Court, sitting in equity, which has jurisdiction. The court is then required to inquire into facts and circumstances without the formal pleading and proceedings applicable to ordinary suits in equity; the expense of the prosecution to be borne not by the shipper, but either by the United States or by the railroad company, or companies, as the court shall order. So far, good; but there is a difficulty to be overcome, in that a court, being a judicial and not a legislative body cannot make a rate for the future. Senator Foraker placidly evades all controversy as to the legislative aspect of a new rate, the ability or inability of Congress to delegate its legislative powers with respect to rate making to a commission, and the other stumbling blocks in the path of rate making which have been suggested by many studious critics. He proposes, in effect, to make rates by injunction:

And upon being satisfied of the truth of the allegations of said petition, said court shall enjoin according to the ground of complaint the publishing and charging of all or any such rate or rates so complained of in excess of what the court shall find to be reasonable and just. . . . or shall enforce an observance of the published tariffs if they are found to be just and reasonable.

That is to say, Senator Foraker would have the court say to the railroads, "I have no authority to establish 15 cents as the grain rate from Chicago to New York, but if you charge more than 15 cents I will enjoin you from putting your rate into effect." In using injunction law the Senator has hit a feature of our judicial system which has very uncertain limits, and we do not presume to say whether the Supreme Court, with its fondness for arriving at the facts in the case as distinguished from the manner in which these facts are presented, will uphold this obvious subterfuge for judicial rate making. The apparent thing is this: that injunction, long known as a resource of great value in times of crisis, is proposed to be made an agent for the transaction of everyday business—as a co-ordinate branch of the government by injunction of which we hear so much whenever a judge interferes with strike violence, we are offered rate making by injunction; provided the Supreme Court allows the lower courts to accomplish by indirection what they are constitutionally unable to do directly.

But even the obvious objections to a bill which rests its whole strength on injunction sink into smallness in comparison with the weak and pitiful demagogic of the paragraph providing for import and export trade carried in ships of American registry. Section 5 provides "that it shall be unlawful to transport foreign commerce that has been imported or that is designed for export at a less rate than is charged between the same points for the transportation of domestic interstate commerce of like character *unless carried in ships of American registry.*" The italics are our own. It is well known that there are many instances where foreign commerce, if it is to move at all, cannot move at the same rate which is charged domestic commerce for the same inland haul. This proposition is a red flag to an agitator who believes that all railroad rates are capable of adjustment on a cost-of-service-per-mile basis, yet it is indubitably true. To give but a single concrete illustration, borrowed from a foreign source, take the traffic in meat ("dead meat," as the English delight to call it) which comes over-sea and passes through Liverpool *en route* to London. If the London & North Western did not greatly reduce its rates on this specific traffic it would not move by way of Liverpool at all, but would go direct by sea to London. The English Railway & Canal Commission fully recognizes this, as we pointed out last week in an abstract of the work done by the Commission, and it permits a substantially lower rate to be made under these circumstances, with only the reservation that the proof that such difference in treatment does not constitute an undue preference, must rest on the railroad. But the Foraker bill flatly prohibits that the rate on over-sea traffic be lower for the rail haul than the domestic rate, unless the goods are carried in ships of American registry.

It is doubtless known that under our present laws restricting American registry to vessels built, or practically rebuilt, in American yards (except by special act of Congress under circumstances which need not be detailed), we cannot move sea freight as cheaply as foreign nations do, because of two governing conditions—the

higher cost of American construction and higher wages. Taking the general run of the cargo-carrying steamers on the Atlantic it may be said, as a rough approximation, that the construction cost of American bottoms is one-third higher, and that the wage cost varies from one-half as much again to twice as much as the wages paid on the foreign ships. In view of Senator Foraker's bland discrimination against the American shipper in favor of the American shipbuilder we are inclined to think that his bill, as an anti-discrimination measure, is handicapped by the scriptural injunction with regard to those persons entitled to throw the first stone.

The general use of compressed air in railroad boiler shops, which has been the principal factor in advancing boiler shop practice to a foremost place in railroad mechanical departments, is being extended at some shops to include the cleaning of crown bars and crown sheets with a sand blast. It is declared to be a big improvement over the old way with hammer and chisel. In a western shop where the sand blast is being used, it formerly took a 17½-cent man ten hours to clean a dozen bars—\$1.75 for the lot. With the sand blast a bar is cleaned in from 20 to 30 minutes, or in about half the time of the old way, and the blast makes a cleaner job. This same shop uses the blast for crown-sheet cleaning with satisfactory results.

Rock Island Company.

The Rock Island Company controls, through the Chicago, Rock Island & Pacific Railroad—a dummy holding corporation—the two groups of railroads known as the Rock Island system and the Frisco system.

The Rock Island system, represented corporately by the Chicago, Rock Island & Pacific Railway, the Chicago, Rock Island & Gulf, the corresponding Texas corporation, and the Chicago, Rock Island & Mexico, covering that part of the line lying in New Mexico, has its nucleus in a line running from Chicago due west to the Mississippi river at Rock Island, Illinois, and Davenport, Iowa. This 182-mile double-track line connects all the rest of the more than 7,000 miles of road with Chicago. At Davenport the Omaha-Colorado line and the Kansas City-El Paso line divide; the one to reach Denver, Colorado Springs and Pueblo, the other bringing Rock Island ownership as far southwest as Santa Rosa, N. Mex., from which point there are close traffic arrangements with the El Paso & Northeastern over the remaining 272 miles into El Paso. These are the two main stems.

The Rock Island's St. Paul-Minneapolis line is comparatively new, track laying on it having been finished early in 1902 by the Burlington, Cedar Rapids & Northern, now absorbed into the system. Of even more recent construction is the St. Louis, Kansas City & Colorado, opened to traffic in August, 1904, which was built to connect the Rock Island system at Kansas City with the Frisco system at St. Louis. It was an expensive line to build, as very favorable grades and curvature were demanded and the best locations between the two cities were already appropriated by one or other of the four existing lines. The Rock Island system also includes a network of branches in eastern Iowa, eastern Kansas and Oklahoma Territory, and the Choctaw, Oklahoma & Gulf, now the Choctaw district, which runs west from the Mississippi river at Memphis to the Panhandle of Texas. During the past year the Arkansas Southern, an independent line 100 miles long running from Eldorado, near the southern boundary of Arkansas, to Winnfield, Louisiana, was acquired. There is a gap of 107 miles between Eldorado and the nearest point on the Rock Island's Hot Springs branch. A connection is now building to bring the Arkansas Southern into the system, and an extension of the Arkansas Southern to the southward is already built to within 30 miles of Alexandria, La. Alexandria is 194 miles from New Orleans.

The backbone of the Rock Island system is the old Chicago, Rock Island & Pacific Railway, which included the Chicago-Davenport line and numerous branches in Iowa, and was for many years one of the most prosperous of the Chicago granger lines. This was acquired about 1901 by a group of men who had made large fortunes in the promotion of certain industrial combinations formed about that time. Under their guidance the railroad was extended by purchases, construction, and the rental of trackage rights, from a mileage of about 3,910 miles in March, 1902, to 6,978 miles fifteen months later, this extension being accompanied by a more than corresponding expansion in capital account. The Rock Island system now includes something over 7,300 miles of line.

The Frisco system is primarily the St. Louis & San Francisco, which has its principal terminals at St. Louis and Kansas City, and operates 5,074 miles of line south of those cities. The Atchison, Topeka & Santa Fe, at the time it went into the 1893 receivership controlled the St. Louis & San Francisco, then operating about 1,000 miles of line. The road was acquired by the Rock Island interests in 1902. Like the Chicago, Rock Island & Pacific, a great expansion has come since that time. Most of the new lines are

in territory as yet undeveloped. The Birmingham line on the other hand reaches into the prosperous iron and steel region of Alabama. At various points in Arkansas, Indian Territory, Oklahoma Territory and Kansas the St. Louis & San Francisco connects with lines of the Rock Island system.

As soon as the St. Louis & San Francisco was taken over by the Rock Island a Chicago connection for it became a necessity. Accordingly the Chicago & Eastern Illinois with its controlled properties, the Evansville & Terre Haute and Evansville & Indianapolis, was acquired. The Chicago & Eastern Illinois was a prosperous Illinois soft coal road with a Chicago terminal. By extensions and a joint trackage arrangement with the Big Four two connections with the St. Louis & San Francisco have been made, one at St. Louis, the other over the recently completed Thebes-Illino bridge.

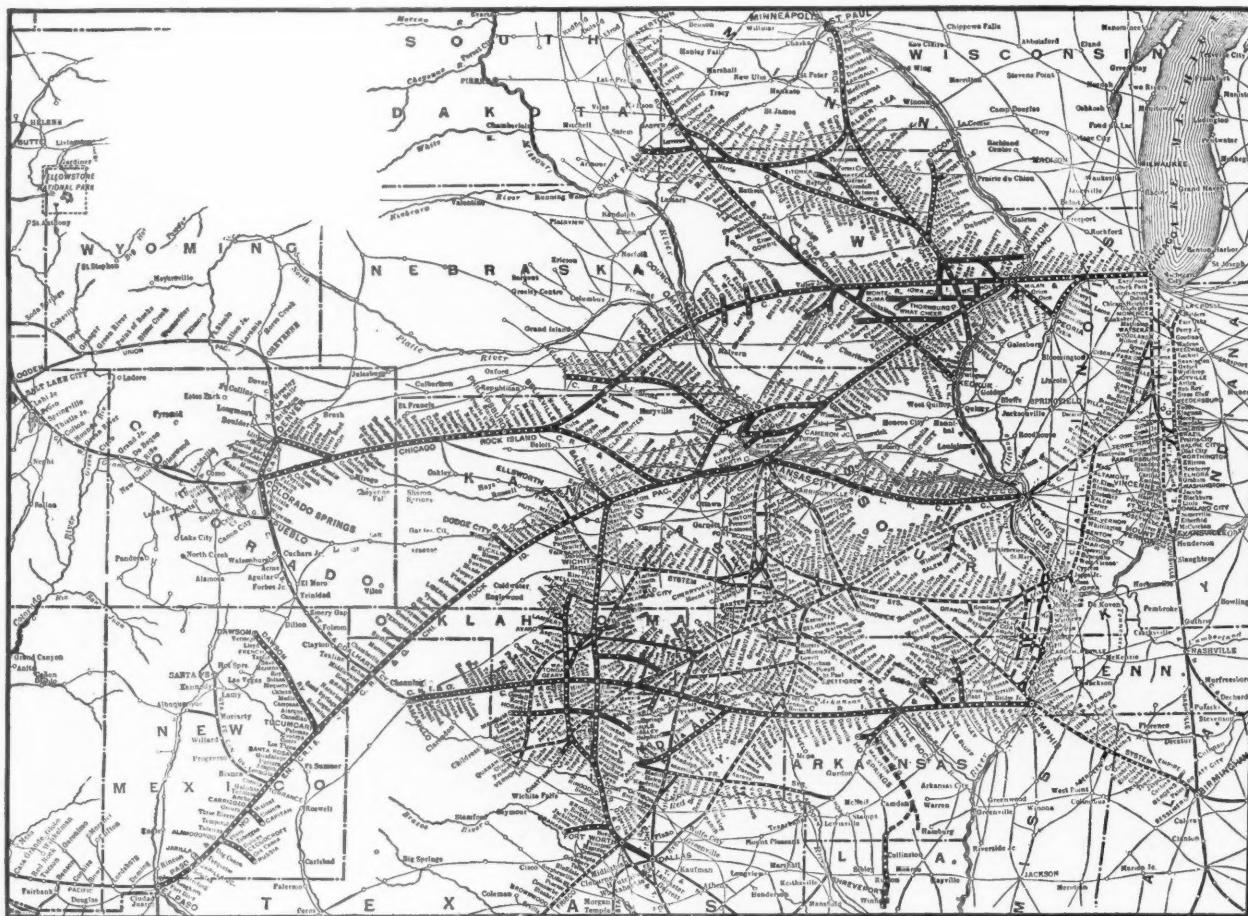
Including the Chicago & Eastern Illinois (948 miles), the Evansville & Terre Haute (164 miles) and the Evansville & Indianapolis (146 miles) the Frisco system has a total of 6,332 miles of line.

The Rock Island system and the Frisco system are both controlled, through ownership of a majority of the stock of each of their controlling corporations by the Chicago, Rock Island & Pacific

The Rock Island system with an average operated mileage of 7,232 miles earned last year \$44,051,509, a decrease of \$917,982 from 1904. Operating expenses decreased nearly as much (\$716,684) with the result that the \$12,993,300 net earnings fell only \$200,000 below those of the preceding year. All but \$9,000 of this decrease was made up by other earnings, leaving net income at \$14,519,472. There was, however, a 15 per cent. increase (\$1,286,129) in taxes, interest and rentals, leaving only \$4,733,109 available for dividends instead of \$6,028,198 left for dividends in 1904. As on the dividends of the Chicago, Rock Island & Pacific Railway Company depends the Rock Island Company's income, the decrease of \$1,295,089 in the dividend fund came near being a serious matter for the holding company. The Railway Company paid dividends amounting to $6\frac{1}{4}$ per cent. against 8 per cent. in the previous year. The decreased dividend rate, however, was still large enough to cover the Rock Island Company's preferred stock dividend.

Gross earnings per mile of road operated were \$6,091, as against \$6,241 in 1904. Net earnings decreased from \$1,831 to \$1,796 per mile.

The \$44,051,509 gross earnings came \$29,660,000 from freight,



Rock Island and Frisco Systems.

Railroad Company of Iowa, a corporation existing to fulfill certain legal requirements in connection with the holding of these stocks. This dummy holding company is itself controlled by the Rock Island Company of New Jersey, whose stock it is that is regularly traded in on the New York stock exchange.

As will easily enough be seen from an attempt to keep in mind the inter-relation of these several parts, the complexity of Rock Island organization is almost without precedent in railroad history. The \$54,000,000 preferred stock of the Rock Island Company of New Jersey has power to elect a majority of the directors, and through control of less than \$28,000,000 of this, worth at present market values only about \$17,000,000, the two combined railroad systems, with a total mileage of over 13,600 miles and a total capitalization of over \$550,000,000, are held in safe control. No overgrown industrial is a better example of holding company finance.

With so complicated an organization it is necessary to examine separate properties in detail in order to get any clear idea of their results as operating railroads. Separate reports are issued for the Chicago, Rock Island & Pacific Railway, the St. Louis & San Francisco, the Chicago & Eastern Illinois, and the Rock Island Company. The first of these covers the Rock Island system.

\$12,000,000 from passenger, and a little over a million dollars each from mail and express earnings. Freight earnings decreased \$1,504,620, or nearly 5 per cent.; passenger earnings increased \$353,748. The principal decreases in freight earnings were from grain, flour, livestock, bituminous coal, lumber and merchandise. The light 1904 wheat crop in Kansas and Oklahoma especially hurt the tonnage of the road. There were at the same time increases in tonnage of cotton, fruit, vegetables, dressed meats, manufactured articles, stone and sand. An especial reason for the decreased earnings was the severity of the winter in the southwest. Gross earnings for the two months of January and February in fact show about two-thirds of the entire decrease for the year.

Maintenance of way decreased over \$1,000,000, or 15 per cent. Most of this decrease was in the one item, repairs of roadway, which fell off \$870,000, or 21 per cent. Maintenance of way cost \$900 per mile against \$1,052 in the preceding year. This and the same figure on the other roads is worked out on the basis of the average mileage operated, plus second track and minus trackage rights. The decrease in this expenditure to a point below what may be considered the normal for its territory and the fact that for two years there has been no new second track built, go to show

that there will have to be sooner or later much larger expenditures directly on the line.

Maintenance of equipment, on the other hand, increased \$643,000, or 13 per cent. Repairs and renewals of locomotives increased 38 per cent.; of passenger cars, 31 per cent.; of freight cars, 17 per cent., and stationery and printing, 46 per cent. On the other hand, superintendence decreased 25 per cent., repairs of shop materials and tools 22 per cent., and other expenses 86 per cent., this from \$499,000 to \$71,000. Repairs and renewals work out at \$2,730 per locomotive in service, \$730 per passenger car, and \$47 per freight car, against \$2,036 per locomotive, \$560 per passenger car and \$43 per freight car in 1904. The 1905 charges, especially the locomotive figure, are high for a road most of whose mileage is in new territory and probably were the result both of under charges to this account in previous years and the unusual difficulty of keeping equipment in repair during the winter.

Conducting transportation cost \$18,000,000, a decrease of \$262,000 from 1904. With an increase of 1 per cent. in engine mileage the cost of fuel for locomotives decreased \$233,000, or 5 per cent., the average price paid for coal being about 21 cents per ton less than the year before. Taken in connection with the large maintenance of equipment charge the increase of \$295,000 in payments for hire of equipment shows that equipment was responsible for more than its share of operating expenses. There was also an increase of \$171,750, or 150 per cent., in car mileage balance, and \$86,800 was paid for switching charges, an entirely new charge. All these are definite expenses which should as soon as possible be decidedly reduced. Over \$200,000 of the saving in operating expenses was made in the two items of advertising and outside agencies, both traffic department expenses. Conducting transportation was 41 per cent. of gross earnings and 58 per cent. of total expenses. These ratios are too high. There is a chance here for a large increase in net earnings through a reduction in the proportion of earnings spent in getting and moving the business.

Freight earnings were 67 per cent. and passenger, 27 per cent. of gross. There were 438,537 tons of revenue freight moved one mile per mile of road, a decrease of 12,634 ton miles. The number of passenger miles per mile of road was 76,453, an increase of 5,100 passenger miles. The average train load increased from 225 to 228 tons, or, including company freight, from 254 to 255 tons.

One large expense which handicaps the Rock Island is payments for rentals, which cost last year \$1,080,277, or \$14 per mile of road. This does not include rents for tracks, yards, terminals, buildings, and other property which appear under conducting transportation, and cost \$244,308, an increase of 71 per cent. over 1904. Trackage cost \$412,583. Here lies a particular weakness of the Rock Island, for of its 7,205 miles of road, 470 are not owned, but represent trackage rights. These cover some of the most important parts of the line and imply a corresponding weakness in terminal facilities. Were it not for the Union Pacific's 90 miles of track from Limon, Colo., to Denver, and the Denver & Rio Grande's 120 miles from Denver to Pueblo, Colorado Springs would be practically the only point of importance reached by the Rock Island system in Colorado. Similarly, 121 miles of the Chicago-El Paso line (the Hannibal & St. Joseph from Cameron Junction, 54 miles into Kansas City, and the Union Pacific from Kansas City to Topeka, 70 miles) are operated under trackage contracts. Of the Minneapolis-St. Paul line 56 miles are made up of trackage rights.

The St. Louis & San Francisco report includes results for the St. Louis & San Francisco and its underlying companies both separately and including the Chicago & Eastern Illinois. Figures for the two Evansville roads are not included in either classification. As the Chicago & Eastern Illinois is a very different sort of road from the rest of the Frisco system, it seems clearer to take up the two parts separately. Besides the difference in its territory and traffic, the Eastern Illinois is different from the Frisco in physical characteristics. For instance, 147 miles of its 948 miles of road is double tracked. The St. Louis & San Francisco is largely new road of light construction in new country in the southwest, and its 5,074 miles of line include only 40 miles of double track.

The Frisco system, exclusive of the Chicago & Eastern Illinois, with an average operated mileage of 5,030 miles, shows gross earnings of \$29,958,240 in 1905 as against \$26,896,731 in 1904, an increase of \$3,061,508. An increase of 814 miles in the average operated mileage is responsible for a good part of this increase. The large amount of new line shows its effect in another way in the reduction of gross earnings per mile of road from \$6,378 in 1904 to \$5,955 in the year just passed. Gross earnings, in other words, increased only 11 per cent. against an increase of 19 per cent. in the operated mileage.

Operating expenses were \$19,297,017, an increase of \$1,540,765 over 1904. This left \$10,661,223 for net earnings, an increase almost as large over the preceding year. Per mile, net earnings decreased from \$2,168 in 1904 to \$2,119 last year. This is the lowest figure since the reorganization of the company in 1896. An increase of

\$1,787,788 in fixed charges, largely due to the taking over of the Kansas City, Fort Scott & Memphis, more than used up the increase in net earnings and left only \$1,024,128 available for dividends as against \$1,342,172 in 1904. Four per cent. dividends were paid on each the first and second preferred stock, and out of the surplus of \$184,386 (a decrease of \$318,000 from 1904) no appropriations were made for betterments, although \$78,500 was the year before appropriated for betterments and flood damages. No payments were made on the common stock and in consequence nothing was received directly by the Rock Island Company as return on its investment in a controlling interest in Frisco shares.

Freight earnings furnished \$1,335,000, and passenger earnings \$1,665,000 of the \$3,000,000 increased earnings. Freight earnings increased 7 per cent. and passenger earnings, 28 per cent. The increase in freight earnings was on the whole fairly evenly distributed among the different commodities. There was an increase of 13 per cent. in the tonnage of products of agriculture, of 12 per cent. in manufactures, 30 per cent. in lumber, 13 per cent. in products of mines, and 16 per cent. in merchandise.

Maintenance of way increased \$461,000, or 15 per cent. Most of this increase was in the three items, repairs of roadway, renewals of ties, and repairs and renewals of bridges and culverts. The largest decrease was one of 60 per cent. in renewals of rails. Maintenance of way figures out at \$727 per mile against \$758 per mile in 1904. Even with the large amount of new mileage this figure is low, though probably not as low proportionately to requirements as is the Rock Island's figure.

Maintenance of equipment increased \$116,000, or 3 per cent. Repairs and renewals cost \$2,333 per locomotive in service, \$698 per passenger car and \$50 per freight car, against \$2,367 per locomotive, \$1,021 per passenger car, and \$59 per freight car in the preceding year. Like the Rock Island, the Frisco shows high maintenance of equipment charges, probably due to very much the same causes—the running down of old equipment which had been improperly maintained and the extra amount of repairs caused by cold weather.

Conducting transportation increased \$853,518, or 8 per cent., and took 37 per cent. of the total earnings and 58 per cent. of the total expenses. The largest increase under this head was one of \$249,714, or 63 per cent., in loss and damage. Other large increases were in superintendence, engine and roundhouse men, train service, switchmen, flagmen and watchmen and station service. The Frisco's problem is evidently much the same as that of the Rock Island—to cut down the proportion of conducting transportation expense. This outlay eats up in both cases a larger share of the earnings than either road can afford. One of the greatest improvements which can be made toward increasing stockholders' profits is in reducing this particular expense.

*Freight earnings were 67 per cent. and passenger earnings 26 per cent. of gross earnings. There were 397,504 tons of revenue freight moved one mile per mile of road, a decrease of 58,521 ton miles from 1904. The passenger traffic density, on the other hand, increased from 60,349 to 66,849 passenger miles per mile of road. The revenue train load increased two tons over 1904, but is low, being just under 200 tons. Company freight brought the average loading up to 228 tons.

During the year there was an increase of over \$21,000,000 in funded debt, which was accounted for, first, by the purchase of the Kansas City, Fort Scott & Memphis, second, by the funding of over \$9,000,000 temporary loans outstanding, and, third, by the purchase of additional shares of Chicago & Eastern Illinois stock, against which \$3,000,000 more preferred stock trust certificates were issued than in the previous year. In capital account the past year has been a critical one for the Frisco in the large amount of temporary indebtedness maturing and the necessity of raising large sums of money to be spent for new and as yet comparatively unproductive mileage. These conditions have been met successfully and the future seems much clearer.

It is from the St. Louis & San Francisco that some critics of the Rock Island Company believe that that company's largest future profits will come. If the southwest is to have a development anything like what has happened in the northwest these predictions surely have a good deal of truth, but on that very development the future of both systems must, more than on anything else, depend, both for solvency and for prosperity large enough to enable the lines to be put into first-class shape. Without the large expenditures for betterments which increased earnings will make possible the roads can never occupy the position in their territory which successful railroads of the northwest hold.

The Chicago & Eastern Illinois with an average operated mileage of 880 miles shows gross earnings of \$8,423,378, a decrease of \$240,665 from 1904. Operating expenses were \$5,755,850, an increase of \$314,417, leaving net earnings of \$2,667,528 against \$3,222,609 in 1904. Operating expenses were 68.3 per cent. of gross earnings. The net income after fixed charges and taxes was \$780,466. Dividends amounting to \$860,732 were declared, leaving a deficit for the year of \$80,266. This is a great contrast with the show-

ing in 1904 when after paying \$126,500 more in dividends and appropriating \$400,000 for new construction and permanent betterments, there was a credit balance of \$358,000. Gross earnings per mile of road were \$9,572 against \$11,521 per mile in 1904. Net earnings per mile of road were \$3,031 in 1905 and \$4,285 in 1904. Freight earnings were \$6,877,727, a decrease of \$327,954 from 1904. Passenger earnings were \$1,332,932, an increase of \$108,900. The report includes no commodity statistics so that it is not possible to trace changes in the sources of freight earnings.

Maintenance of way shows an increase of \$50,000, which occurred largely in repairs of roadway and renewals of ties. There were considerable decreases in renewals of rails and repairs and renewals of buildings and fixtures. Per mile, maintenance of way cost \$744 against \$754 in 1904. These figures are unusually low for a coal road.

Maintenance of equipment as a whole increased from \$1,198,179 in 1904 to \$1,231,288. The largest increases were in repairs and renewals of locomotives and of passenger cars. Repairs and renewals cost \$2,431 per locomotive, \$598 per passenger car and \$32 per freight car against \$2,234 per locomotive, \$379 per passenger car and \$42 per freight car in 1904. The freight car charge is low for roads of this class.

Conducting transportation cost \$3,485,609 against \$3,324,247 in 1904. There was an increase of 170 per cent. (from \$94,000 to \$255,000) in the account "Injuries to Persons," and of over 100 per cent. in "Loss and Damage"; also a decrease from \$171,690 to \$892 in switching charges balance, and a decrease of over 100 per cent. in hire of equipment balance; otherwise there were no striking changes in the separate items. Conducting transportation took 45 per cent. of gross earnings and 61 per cent. of operating expenses.

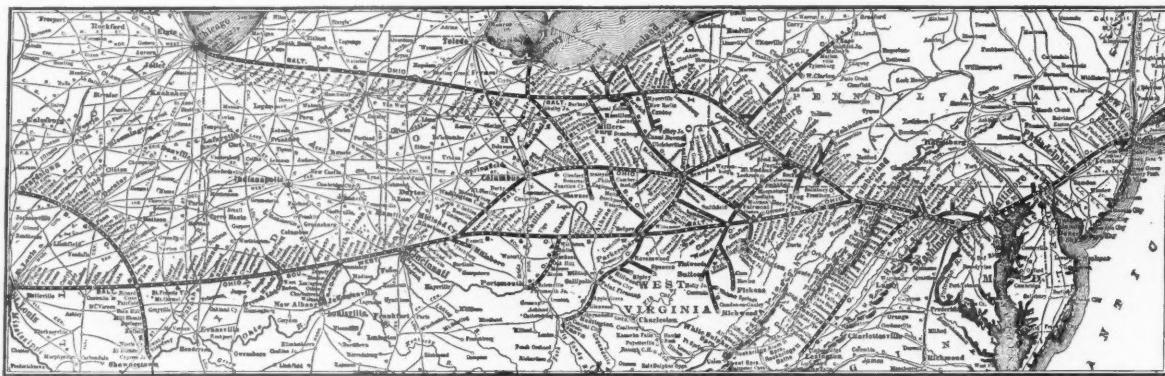
There were 1,691,328 tons of freight carried one mile per mile of road against 2,046,188 in 1904. Passenger traffic density also decreased from 91,806 passengers one mile per mile of road in

similar possibilities. The only reason for thinking them less is because the Santa Fe started at a low level of prosperity with lessened capitalization, while the new Rock Island began its career in a time of great prosperity, which was discounted or more than discounted by very large increases in its capital accounts.

Baltimore & Ohio.

The long and interesting career of the Baltimore & Ohio Railroad was summarized in the *Railroad Gazette*, August 18, 1905, and we pointed out then that Mr. Murray's report this fall would be the seventy-ninth consecutive document of this character issued by the road; a record of continuous history which no other company in the country can equal. Mr. Murray, whose career as President of the company began in 1904, after many years of usefulness as an officer, took hold of the property after the reconstruction from the bad methods of earlier years had been completed, and he has been carrying it through a high tide of prosperity. Gross earnings from operation of the entire system for the year ending June 30, 1905, amounted to \$67,689,997, an increase of \$2,618,916 from the year previous. The increase in operating expenses was smaller than the increase in earnings, leaving net earnings of \$22,979,394 as compared with \$21,442,217 last year. After adding income derived from dividends and interest on securities owned and from miscellaneous sources, and after deducting interest, rentals, taxes and other charges, there remained a net income of \$13,673,996, as against \$12,357,360 last year. Beginning with Sept. 1, 1905, the dividends on the common stock were put on a 5 per cent. basis. The statements of income in this paragraph being for the entire system, of course include the Baltimore & Ohio Southwestern.

A year ago at this time, and also two years at this time, almost every report received from railroad companies, large and small, showed an alarming increase in operating expenses compared with



Baltimore & Ohio.

1904 to 71,350 in the year just passed. The train load is unusually heavy—568 tons, or 599 tons, including company freight.

The Rock Island Company's report is, except for the income account, profit and loss account, and the briefest of balance sheets, merely a repetition of various statistics of the Rock Island and Frisco systems. The income account shows that the total income of the Rock Island Company—all but \$28,877 from the C. R. I. & P. Ry. Co.'s dividends—was \$5,510,000. Of this amount \$3,683,892 was paid as interest on C. R. I. & P. R. R. Co.'s bonds issued in exchange for Rock Island and Frisco stocks. This was an increase of \$132,000 over the corresponding fixed charge payment in 1904. The balance available for dividends was \$2,011,254, of which four per cent. on the Rock Island Company's preferred stock took \$1,950,210 or all but \$61,044. This sum was the Rock Island Company's surplus for the year. Although the large increases in earnings reported by the C. R. I. & P. Ry. since the close of the fiscal year, make it improbable that current rumors of the passing of the next Rock Island Company preferred dividend have much truth, such reports have at least some justification in this small surplus and in the far from first-class condition of most of the controlled railroads as operating properties.

To-day Rock Island in railroad language, instead of standing for the conservative and well-known granger railroad which operated so many years successfully west from Chicago, has come to represent a very large and, it cannot be denied, a very over-grown collection of all sorts of railroads. Thus far, the policy of extension has not produced wonderfully favorable results. Whether within the next few years the Rock Island system and the Frisco system can be brought to a point where operation is increasingly profitable and earnings and dividends are entirely secure, will depend on the wisdom of the management and in particular on the continued development and prosperity of the southwest. The Santa Fe has been brought within ten years from an apparently hopeless tangle of bankrupt roads to its present strength. The group of railroads controlled by the Rock Island Company has great and perhaps

the increase in gross earnings. The Baltimore & Ohio has fully corrected this tendency, as is shown by the report at hand, and it is especially encouraging to see a falling off in the cost of conducting transportation in the face of a larger traffic handled. The easiest place to economize in the expense account of a railroad that is shown in an annual report is in maintenance of way and structures; the hardest is in the cost of conducting transportation. Maintenance of way and structures this year increased from \$6,839,882 to \$7,852,636 on the Baltimore & Ohio, and maintenance of equipment increased from \$10,530,211 to \$10,937,106; while conducting transportation and general expenses each showed considerable decreases. Looking at these items more in detail, it is seen that the increase in maintenance of way and structures was due primarily to the charge for rails, and in maintenance of equipment to repairs to locomotives; while under the head of conducting transportation the principal economy over the preceding year was in locomotive fuel, and this item, plus the additional credit to the road for car service as compared with 1904, would alone account for the better showing of the department. As a matter of fact, out of the 41 items in the operation side of the conducting transportation charge, 23 showed decreases from the year previous, the most important decrease from 1904 being in the items, loss and damage, signalmen, and hire of equipment. A separate charge of eight items is also made against the traffic side of conducting transportation; these items include passenger superintendence, foreign agencies, advertising and stationery and printing for the passenger department, and the corresponding items for the freight department. In view of the fact that this classification has only been made in the company's reports since 1903, and that it contains three more items this year than ever before, it is interesting to place the eight as given in the order of their importance. Foreign agencies for freight cost the most (\$443,449 out of a total of \$1,535,185 under this head); freight superintendence cost a trifle less. Foreign passenger agencies come next in importance, with \$260,867, and then, considerably below, come passenger advertising,

passenger superintendence, freight stationery and printing, passenger stationery and printing, and freight advertising. This last cost only \$200, in the year under review.

The route mileage worked for the current year was 4,026, and the company shows a considerable increase in ton miles and in passenger miles. The distance traffic is moved is shown by the fact that the average haul was 189 miles. In 1901 this average reached 213 miles, and the present is the lowest since 1897. These figures exclude company freight, and the shorter average haul of recent years may perhaps be attributed to the large increase in the tonnage of bituminous coal carried. The bituminous coal traffic of the Baltimore & Ohio has been increasing very rapidly with additional purchases of coal territory. In 1900 the bituminous coal carried, including the Baltimore & Ohio Southwestern, amounted to 12,158,330 tons. This current year it amounted to 20,125,514 tons, and along with this increase in actual tonnage its proportions to the total traffic hauled increased during the same period from 39.81 to 42.56. The grain traffic of the road is not quite as strong proportionately as the coal traffic, with an aggregate tonnage much smaller; and decreased from 1,654,303 tons in 1900 to 1,107,789 tons in 1905, with but a single increase during the period, that for the year 1901. Next to bituminous coal the heaviest tonnage carried was coke, and this has been true for a number of years. Merchandise traffic has fallen off somewhat, both absolutely and relatively in recent years. Taken altogether, however, the traffic density in 1905 amounted to 2,218,955 ton miles per mile of road as against 2,096,559 ton miles per mile of road in 1904. The average ton mile rate decreased from .582 cent to .566 cent, a decrease presumably also accountable to the increase in coal traffic; but it is interesting to see that the average ton mile rate which the company has been able to obtain was higher this year than in any previous year since 1896, with the single exception of 1904. This rate fell as low as .390 cent in 1899, constituting the company's low record.

The increase in passenger earnings was \$670,693, and the number of passengers carried 115,311. The large travel to the St. Louis Exposition contributed to this result, but apart from this the passenger traffic was encouraging. The average haul on account of the Exposition travel reached 45.46 miles, which is considerably higher than any previous record. In 1889 this average haul was only 30 miles. At the time of the World's Fair in Chicago it jumped from 36½ miles to 43.6 miles, and returned again to its former average immediately afterwards; but ever since 1902 the average passenger haul has been higher than 40 miles.

The capital account shows new issues during the year of \$4,841,000 bonds, divided unequally between prior line 3½s, first mortgage 4s, Southwestern division 3½s, and P., L. E. & W. V. refunding mortgage bonds. The proceeds of these issues are applicable for improvements, betterments and extensions, as provided in the respective mortgages. In exchange for old securities and for 10-year gold convertible debentures, \$13,712 of new stock was also issued, and \$2,301,900 of P., L. E. & W. V. 4 per cent. refunding mortgage bonds. The total capital liabilities aggregate \$429,864,998, or \$106,772 per route mile. Last year they stood at \$422,779,287, or \$106,039 per route mile.

Principal statistics of operation follow:

	1905.	1904.
Freight earnings	\$50,607,087	\$48,617,103
Passenger earnings	13,817,141	13,146,449
Gross earnings	67,689,997	65,071,081
Maint. way and structures	7,852,636	6,839,882
Maint. equipment	10,937,106	10,530,211
Conducting transportation	24,543,341	24,777,870
Total expenses	44,710,604	43,628,861
Net earnings from operation	22,979,394	21,442,217
Gross income	25,956,392	24,090,815
Net income	13,673,996	12,357,360

*This figure and the ones following exclude 456 miles of line controlled by or affiliated with the B. & O., but not worked directly. They include the B. & O. Southwestern.

TRADE CATALOGUES.

The Cole 4-Cylinder Balanced Compound Locomotive.—The Cole 4-cylinder balanced compound locomotive is described in a 36-page pamphlet, which is about to be issued by the American Locomotive Co., New York. The reasons for recommending this form of construction of locomotives to meet American conditions, are first outlined, and the locomotives of this type applied to the New York Central & Hudson River, the Erie and Pennsylvania Railroads, are illustrated from photographs, and the leading dimensions of each design given by means of tables. To illustrate the chief details of construction, the New York Central locomotive No. 3000, which was among the locomotives tested at the Louisiana Purchase Exposition, is selected for description. Line engravings show elevations and sections of the locomotive as a whole, the construction of the frames, cylinders, crank-axes and valves. A brief statement of the performance of this locomotive on the Pennsylvania Railroad testing plant at St. Louis is presented, followed by six different arrangements showing the application of 4-cylinder balanced compounding to different types of freight and passenger locomotives, each of the

types being illustrated by an outlined diagram. The pamphlet also includes an arrangement of cylinders served by a single valve, the cylinders being in the same transverse plane. It concludes with comments from the technical press concerning this type of locomotive. In view of the important requirements which 4-cylinder locomotives are designed to meet, a study of this pamphlet is recommended to those who have to do with the determination of designs of locomotives.

Rock Drills.—The Chicago Pneumatic Tool Co., Chicago, has extended the scope of its business by entering into the sale of rock drills for mining, tunneling and quarrying work generally, and to this end has effected an arrangement whereby it has acquired the selling rights to the McKiernan rock drills, which are made under its supervision at Dover, N. J. The company has just issued a catalogue in which the various sizes and designs of these drills are illustrated and described.

Motor Cars.—Illustrations and general dimensions of various types of Sheffield gasoline motor cars are given in a catalogue issued by Fairbanks, Morse & Co., New York. Several types of "section" motor cars are also shown and a brief talk on the relative advantages of "Motor Cars vs. Hand Cars" is given.

Electric Elevators.—Freight elevators, passenger elevators, and elevators of special design, operated by steam, electricity and hydraulic power are illustrated and described in a handsome catalogue just issued by the Otis Elevator Company, New York.

The Mallet Articulated Compound Locomotive.—A brief general description of this type of locomotive, including both line and half-tone illustrations is given in a neatly gotten up pamphlet published by the American Locomotive Company.

Hollow-Chisel Mortiser.—An improved machine for cutting mortises for framing and other purposes is illustrated and described in a neat folder issued by the S. A. Woods Machine Co., Boston, Mass.

CONTRIBUTIONS

Different Kinds of Signals in England.

London, Nov. 21, 1905.

TO THE EDITOR OF THE RAILROAD GAZETTE:

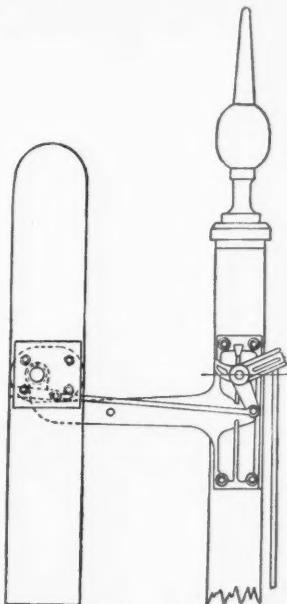
In connection with the recent discussions in your columns of the question of forms of signals and the arguments, pro and con, on the subject of standardization and on adapting the forms of signals more specifically to different uses, your American readers

may be interested to know that the signaling art in Great Britain is not so completely settled as one might imagine from a superficial view. Many English readers have been interested in what has been told about America, and it may be of passing interest now to tell Americans something of the situation in England.

In the matter of outward form, except in one feature, the front lights of signals, there is no uniformity existing. Even in that particular there is a divergence, as some companies still use a blue light for danger in certain signals. It would therefore be more correct to say that the only standard is the adoption of the green light for clear.

It is true that there is a general adoption of the practice of placing signals on the left side of the running (left) road (track), but the custom is not so universal as is desirable, and it is often spoiled

by locating signals outside side-tracks when space does not permit of their being placed immediately adjoining the line to which they apply. A bad practice also still prevails on some lines, where there are two lines in the same direction, of placing the signals for the two lines side by side. The objection to this ar-



Balanced Signal Arm—Great Northern of England.

angement is that under English practice the signals might be mistaken for the splitting signals for a junction and therefore applicable to one line. Also the steam from a train in advance on one road (track) may obscure the signal for the second train on the other road. Some companies endeavor to remedy this by putting a distinguishing mark, such as a ring, on the arm for the slower line, but this is worthless at night and cannot be adopted when both lines are of equal importance.

Under such conditions the signals should be carried on a bridge, but this expense may be avoided by the use of a specially constructed bracket signal whereby the mast for the inner line is carried over the parallel line. Another general practice on British lines that ought to be standardized is that the signals at junctions should be "stepped" (i.e., graduated in height) according to the importance of the lines they are leading to. To appreciate this point it must be remembered that in Great Britain the blades of junction signals are not placed above each other, but each line to which access can be obtained has its signal on a separate mast. These should be graduated in height according to the importance of the line they lead to. Each blade should be about 3 ft. below the one next higher.

As the reader has been reminded by the letter of Mr. Henry Johnson, the signals for diverging routes are fixed according to a different plan here, a separate mast being used for each arm. While it is difficult for an Englishman, or any one else, to find fault with the American practice of putting the blades one above another on the same post, the point should be noted that this practice is not likely ever to meet with favor in England so long as distant signals at night are precisely the same as home signals; red and green lights being used on home signals and the same on the distants. With this practice a two-blade junction signal would look at night precisely the same as a home and a distant signal on the same post.

It must be said that England is behind America in the arrange-

way about 20 years ago. The whole of the Great Northern lines now have signals like that shown in the foregoing illustration. This design was adopted (I think, in 1885) after a serious collision was caused by snow on the blades. Other English companies use this same signal and it is free to the world. I understand that it is looked upon as a successful solution of the snow and ice difficulty. The blade is centrally balanced and it can be used as a three-position signal.

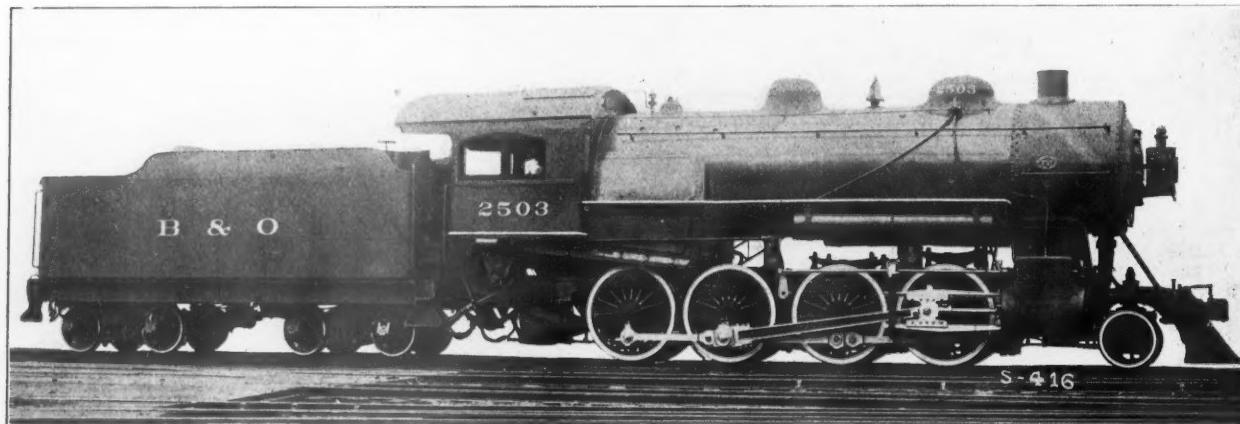
On the question of the three-position signal *per se*, while no one denies the economies to be gained, how do you deal with the question of manually operated signals? And how would you arrange the blades at a junction where there are one or more diverging routes? Mr. Salmon, in his interesting letter, merely hints at this problem but gives us no solution of it.

While signal engineers are strongly attracted by the persuasive arguments of the three-position advocates there still remains the question, perhaps rather hard to decide, of the attitude of the drivers. I believe it is a fact that most locomotive enginemen pay but passing notice to signals at clear—that is, any signal which does not stop them absolutely. It is a signal in the "on" position that attracts the driver's attention. This being so, is it not likely that a driver may in running through a section fail to remember the condition of a signal he has passed in the "off" position?

x.

Heavy Consolidation Locomotives for the B. & O.

The Baltimore & Ohio is receiving the first of a lot of 210 consolidation (2-8-0) freight locomotives, 70 of which are being built at the Richmond works, and 140 at the Schenectady works of the American Locomotive Company. This order was placed last April in connection with an order for 25 passenger and five switching engines and 10,000 freight cars at an aggregate cost of about



Heavy Consolidation (2-8-0) Type Locomotive for the Baltimore & Ohio.

ment of signals for entering upon two or more low speed routes. You have already introduced extensively the practice of making one arm answer for any number of such routes, while here the idea that there should be a separate arm for each road or track still finds much favor. As you have probably observed, the North Eastern and the London & South Western have put in use some of Annett's indicating signals, which is nothing more nor less than a revival of the indicator which was abandoned in the United States several years ago. The same principle has been tried on certain other English lines, but it is difficult to see the wisdom of it, unless we are to go on experimenting forever.

You are, of course, familiar with the inconsistent use in Great Britain of the same night indication on distant signals as on home signals. The only rational defence of this practice is that it has not yet done any particular harm. Yellow glass has been tried but does not find favor, and now a reflected light giving a > shape by the side of the color indication is being extensively tried.

In the matter of the shape of blades of signals for switching movements where disk or dwarf signals are not used, there is much difference in Great Britain. Opinions also differ as to the interlocking of "calling-on" arms and the home or starting signals, below which these are placed. These arms merely act in place of verbal instructions from the towerman. Some British companies compel this arm to be lowered before the stop blade can be pulled, but the only consistent arrangement is to treat them as conflicting signals and have them regularly interlocked.

In connection with the recent proposition in your country to use the upward inclination of the blade for the all-clear indication, the fact should be noted that the problem which it is now attempted to settle received attention on the Great Northern Rail-

\$14,000,000. This will give the road better and a larger amount of equipment than it has ever had.

In order to produce a design of locomotive that might be expected to yield the best practical results in freight service on all divisions of the road, the following plan was tried: A sample locomotive was built in accordance with the original specifications, and delivered. The motive power department appointed three committees, one consisting of the superintendent of motive power, mechanical engineer, engineer of tests and the shop master mechanics; another, of the division master mechanics; and the third of the road foremen of engines, each of which brought with him a locomotive engineman and fireman from his division. Upon the arrival of the sample locomotive, certain parts were disconnected and the members of the committees given an opportunity to examine the details of design and construction. The locomotive was then connected up again and put under steam to give the committees opportunity to observe its operation, hauling capacity and steaming and riding qualities. The committees were instructed to submit reports after their investigations, giving any criticisms and recommendations and reasons for any changes that might be suggested. It is understood that these reports contained many valuable suggestions, which have been quite helpful in producing a design that it is thought will yield satisfactory general results.

The consolidation type decided on weighs about 208,000 lbs. in working order, has 60-in. driving wheels, 22 in. x 30 in. cylinders, 205 lbs. boiler pressure, radial stayed boiler and a tender capacity of 14 tons of coal and 7,000 gallons of water. The tractive power is about 40,000 lbs. Five of the present lot will be equipped with the Walschaert valve gear. Delivery is expected to be completed early in February, 1906.

Full Text of the Foraker Bill.

A bill to further regulate commerce with foreign nations and among the states, and to amend the laws on that subject now in force.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in addition to the powers heretofore conferred on the Interstate Commerce Commission it is hereby authorized to appoint from time to time such expert bookkeepers or accountants or other suitable persons as may be necessary, for the purpose of thoroughly examining, under its direction, the books, records, and transactions of common carriers engaged in interstate commerce with respect to all matters pertaining to the transportation of such commerce.

The persons so appointed shall be, and they hereby are, vested with full power to examine under oath any or all of the officers and agents of such carriers touching such interstate-commerce transportation, and they shall make a full detailed report of all such examinations to the said Interstate Commerce Commission in such form and at such times as it may prescribe; and all carriers so engaged in interstate commerce are hereby required to permit such examinations of their books, records, officers, and employees, and do all other things necessary and proper to facilitate such examinations.

Sec. 2. That section three of the Act approved February nineteenth, nineteen hundred and three, entitled "An Act to further regulate commerce with foreign nations and among the states," be, and the same is hereby, amended so as to read as follows:

"Sec. 3. That whenever the Interstate Commerce Commission shall have reasonable ground for belief that any common carrier is engaged in the carriage of passengers or freight traffic between given points at less than the published rates on file, or is, either singly or in co-operation with one or more other carriers, publishing and charging unjust or unreasonable rates therefor, or is committing any discriminations forbidden by law, whether as between shippers, places, commodities, or otherwise, and whether effected by means of rates, rebates, classifications, preferentials, private cars, refrigerator cars, switching or terminal charges, elevator charges, failure to supply shippers equally with cars, or in any other manner whatsoever, it shall be its duty, if such carrier or carriers will not, after due notice, desist from such violation of the law, to file with the Attorney-General a brief statement of its grounds for such belief and the evidence in support thereof, and thereupon, under his direction, and in the name of the United States, a petition shall be presented alleging such facts to the Circuit Court of the United States sitting in equity having jurisdiction; and when the act complained of is alleged to have been committed or as being committed in part in more than one judicial district or state, it may be dealt with, inquired of, tried, and determined in any one of such judicial districts or states, whereupon it shall be the duty of the court summarily to inquire into the facts and circumstances, upon such notice and in such manner as the court shall direct and without the formal pleadings and proceedings applicable to ordinary suits in equity, and to make such other persons or corporations parties thereto as the court may deem necessary; and upon being satisfied of the truth of the allegations of said petition said court shall enjoin according to the ground of complaint the publishing and charging of all of any such rate or rates so complained of, in excess of what the court shall find to be reasonable and just; such injunction to continue in force during such period as the same or substantially the same conditions may continue, as are established by the evidence in such case; or shall enforce an observance of the published tariffs if they are found to be just and reasonable; or direct and require a discontinuance of such discriminations, by such proper orders, writs, and process, as will, as nearly as may be, secure equality of right and treatment to all shippers, which said orders, writs, and process may be enforceable as well as against the parties interested in the traffic as against the carrier or carriers complained of; and all proceedings hereunder shall be subject to the right of appeal to the Supreme Court as now provided by the Act of February eleventh, nineteen hundred and three, to expedite the hearings of suits in equity; but such appeal shall not operate to stay or supersede the order of the court or the execution of any writ or process thereon, unless the Circuit or Supreme Court, on application therefor made for good cause, so order. It shall be the duty of the several district attorneys of the United States, whenever the Attorney-General shall direct, either of his own motion or upon the request of the Interstate Commerce Commission, to institute and prosecute such proceedings, and the proceedings provided for by this Act shall be prosecuted at the cost of the United States or the railroad company or companies as the court may adjudge equitable and just, and such proceedings shall not preclude the bringing of suit for the recovery of damages by any party injured, or any other action provided by said Act approved February fourth, eighteen hundred and eighty-seven, entitled "An Act to regulate commerce and the Acts amendatory thereof." And in proceedings under

this Act and the Acts to regulate commerce the said courts shall have the power to compel the attendance of witnesses, both upon the part of the carrier and any shipper or shippers who may be interested, who shall be required to answer on all subjects relating directly or indirectly to the matter in controversy, and to compel the production of all books and papers, both of the carrier and the shipper or shippers, which relate directly or indirectly to such transaction; the claim that such testimony or evidence may tend to criminate the person giving such evidence shall not excuse such person from testifying or such corporation producing its books and papers, but no person shall be prosecuted or subjected to any penalty or forfeiture for or on account of any transaction, matter, or thing concerning which he may testify or produce evidence or information, documentary or otherwise in such proceeding: Provided, That the provisions of an Act entitled "An Act to expedite the hearing and determination of suits in equity pending or hereafter brought under the Act of July second, eighteen hundred and ninety, entitled 'An Act to protect trade and commerce against unlawful restraints and monopolies,' 'An Act to regulate commerce,' approved February fourth, eighteen hundred and eighty-seven, or any other Acts having a like purpose that may be hereafter enacted, approved February eleventh, nineteen hundred and three, shall apply to any case prosecuted under the direction of the Attorney-General in the name of the Interstate Commerce Commission."

Sec. 3. That no carrier engaged in interstate commerce shall, directly or indirectly, by any special rate, rebate, drawback, or other device, charge, demand, collect, or receive from any person a greater or less compensation for interstate transportation of passengers than it charges, demands, collects, or receives from any other person for a like service. And any carrier violating this provision shall be deemed guilty of unjust discrimination and shall for each offense pay to the United States a penalty of not less than one hundred nor more than two thousand dollars: Provided, That nothing herein shall prevent the free carriage of destitute or indigent persons, or the issuance of mileage or excursion passenger tickets, or prevent such carriers from giving free or reduced transportation to ministers of religion, or to the inmates of hospitals, eleemosynary and charitable institutions, or to prevent any such carrier from giving free transportation over its own lines to any of its officers, agents, employees, attorneys, stockholders, or directors, or to the families of its employees.

Sec. 4. That nothing in the Act to regulate commerce, approved February fourth, eighteen hundred and eighty-seven, or in the Act to protect trade and commerce against unlawful restraints and monopolies, approved July second, eighteen hundred and ninety, or in any Act amendatory of either of said Acts, shall hereafter apply to the establishment of rates or the changing or publication of the same with respect to foreign commerce if carried in ships of American registry; or shall prohibit any necessary or reasonable act, association, or agreement with respect to interstate transportation that is not in unreasonable restraint of trade or commerce with foreign nations or among the several states; or shall hereafter authorize forfeiture of property as punishment for any violation of such Acts.

Sec. 5. That it shall be unlawful to transport foreign commerce that has been imported, or that is designed for export, at a less rate than is charged between the same points for the transportation of domestic interstate commerce of like character unless carried in ships of American registry.

Sec. 6. That the Interstate Commerce Commission is hereby authorized and empowered to appoint such inspectors and adopt such other means as may be necessary to ascertain what foreign commerce is carried in ships of American registry and on that account entitled to the benefits of the provisions applicable thereto of sections four and five of this Act.

Sec. 7. That all laws and parts of laws inconsistent with the provisions of this Act are hereby repealed, and this Act shall take effect from and after its passage.

Mr. Wallace Before the Panama Board.

While the proceedings of the meeting of the Consulting Board of Engineers for the Panama Canal, held on Friday, November 3, when Mr. John F. Wallace, former Chief Engineer of the Isthmian Canal, appeared before the board, have not been published, it is understood that Mr. Wallace strongly recommended the construction of a sea-level canal on the general plan outlined in his official report of Feb. 1, 1905.

Mr. Wallace, in response to the invitation of the board, had previously submitted for its consideration a series of notes covering technical studies, the advantages and disadvantages of various suggested plans, including the sea-level multilock and intermediate lake projects, and a very complete analysis of the cost records as shown by the experimental and other work conducted on the Isthmus under his administration as Chief Engineer, from July 1, 1904, to June 30, 1905. He also suggested general plans and

methods of construction and presented estimates of unit costs and time required to complete the excavating and other classes of work. The facts and recommendations contained in these notes had already been read to the members of the board, and formed the basis of Mr. Wallace's examination Friday afternoon.

Mr. Wallace stated that he strongly advocated the sea-level project, as in the consideration of designs for transportation routes a straight and level line was the most desirable, and in his opinion, there were no obstacles to be overcome except such as could be measured by time and cost, and the estimates laid before the board by him developed the fact that such a project could be completed at a reasonable cost to the American people, the saving in the maintenance and operating expenses of the sea-level over any other plan being a large offset to the increased interest on the greater cost of construction.

As to time, Mr. Wallace considered as a very conservative estimate that in eight years from Jan. 1, 1906, the canal could be opened to navigation and completed in ten years—at most twelve. This conclusion was based on the length of time required to excavate the divide, or what is known as the Culebra cut, or central section of the canal, where there is concentrated within a stretch of from five to eight miles 100,000,000 cu. yds. of material of approximately one-half the total amount of excavation necessary for a sea-level canal, which will have to be removed—it being safe to assume that all other excavating and auxiliary work can easily be completed in a much shorter period than that required for the central excavation.

The method of excavation suggested by Mr. Wallace for the Culebra cut consists of the installation of modern American steam shovels at the rate of 24 each year (there being 10 already employed on the work) until at least 82 shovels are installed and constantly at work on this central five-mile section. While the theoretical capacity of the steam shovel is in the neighborhood of 4,000 cu. yds. per day, in his calculation as to time, Mr. Wallace, from his experience on the Isthmus and his knowledge of conditions both in this country and there, estimates the average daily capacity of each steam shovel, with proper train service to haul away the spoils, at 800 cu. yds., which would admit of the excavation of practically 111,000,000 cu. yds. of material within the above mentioned period of eight years, with an average of only 21 working days to the month, and without taking into consideration the practicability of night or extra shifts.

To properly install these steam shovels, Mr. Wallace recommends the terrace plan of excavation, with horizontal spacing of 25 ft. and a perpendicular face of about 28 ft., by cutting down with a series of terraces and sinking the central portion of the excavation to the maximum depth as soon as possible. This method permits of obtaining the ultimate grade for a sea-level canal with a great deal less excavation than the entire canal section would call for—approximately 25 to 35 per cent. less, according to the desired bottom width of the temporary section—leaving the widening to be done after the canal is opened for traffic. Mr. Wallace, in this connection, called particular attention to the necessity for proper track facilities and dumping grounds, as the capacity of the steam shovel was practically dependent upon the rapidity with which it was supplied with empty cars and the loaded ones removed. His plans provided for four distinct main track railroad systems leading from the cut, two at each end of the central excavation and one on each side of the canal axis, to consist of at least two main running tracks with the Panama Railroad as a base; with a greater amount of the excavated material going to spoil banks on the flats between Miraflores and La Boca on the Pacific side, and a portion to the Gamboa dam site for construction purposes and other dumping grounds between the canal axis and the foot hills. He estimated that each steam shovel would require about three miles of track, making approximately 250 miles of track for the Culebra section alone.

Mr. Wallace also recommended building the Gamboa dam in connection with a sea-level or any plan adopted with a summit level of not to exceed 60 ft. He strongly advised against building any dam on alluvial formations or where it could not be founded on bedrock or an impervious curtain wall constructed thereto. He was likewise opposed to building any high dam, the destruction of which would prevent the operation of the canal until it was replaced.

As to costs, Mr. Wallace, both in his notes and in the hearing before the board, carefully analyzed the various items of mining, excavating, and loading, maintenance of tracks, transportation, dumps, general expense, and arbitraries to cover plant, which go to make up the unit cost of excavation. He gave to the board the result of his experimental work with the old French machinery, rails, engines and car equipment, which were unsuited to economical and efficient prosecution of the work, the only modern part of the plant being the few American steam shovels installed after November, 1904. The figures submitted showed a maximum output for the month of March (part of the dry season), 1905, of 133,000 cu. yds. at a minimum cost of 43 cents per yard. On the data

obtained from this experimental work, conducted with inexperienced labor and with old appliances and equipment, and in the light of his experience on similar work in the United States with modern plants, Mr. Wallace reached the conclusion that the unit cost of the Culebra excavation, with the use of modern machinery and equipment, and proper methods and supervision, should not exceed 50 cents per cubic yard; or with 20 per cent. added for contingencies, making a total conservative estimate of 60 cents per cubic yard of material excavated.

Mr. Wallace took occasion to invite especial attention to the fact that his estimates both as to time and cost were predicated on the assumption that the work would be conducted in an efficient, vigorous and up-to-date manner, and that existing governmental methods, which are responsible for innumerable delays and difficulties would be so modified as to permit of the prosecution of the work with the same expediency, economy and competent personnel, required and found in all great undertakings not under governmental control.

Mr. Wallace also gave careful consideration to and placed at the disposal of the board his information and views concerning the treatment of other portions of the work, including the harbors at Colon and Panama, the construction of dams and locks and the sea-level portions of the canal. He expressed the hope that if the board failed to recommend the adoption of the sea-level project, no plan should be considered by it that would interfere with the ultimate accomplishment of this desirable object.

It seems that the information heretofore obtained from the engineers who had either been connected with the work but a short time or were familiar with only some detail of it, was not sufficient to enable the board to arrive at correct conclusions, but the data on record, reviewed and explained by Mr. Wallace, who had been closely connected with all parts of the work and had planned and carried out the various investigations on the Isthmus, will no doubt prove of invaluable assistance to the members of the Consulting Board in determining the facts and in formulating their recommendations for the canal project as a whole. It is the consensus of opinion that the presentation of the case by Mr. Wallace made a very deep impression on the individual members of the board, and as it is understood that he declined to appear before the board until assured that it was agreeable to Secretary Taft, it is interesting to note that at the conclusion of the hearing not only was the motion made to thank Mr. Wallace for the papers he had submitted and for the able way in which he had informed the board of his views on the subject, but the foreign members went so far as to say that the members of the board who were strangers in this country were especially indebted to Mr. Wallace for the trouble he had taken for the free, frank manner in which he had laid his acquaintance of the situation before them. This sentiment was warmly subscribed to by all the members present, and the vote of thanks was pronounced the unanimous action of the board and made a part of its proceedings. Mr. Wallace then expressed his appreciation of the kindness with which he had been treated.

As an incident of the invitation to Mr. Wallace to appear before the board, it may be mentioned that he declined to accept any compensation for his professional services, being perfectly willing to give the administration the benefit of his experience and knowledge without remuneration. It is thought by those in a position to know that the Secretary of War and Administration are more kindly disposed toward Mr. Wallace, and while there is an impression that if he had been less abrupt in his presentation of his matter to the Secretary last June the misunderstanding which occurred at that time might have been avoided, the indications now are that the incident will be closed with a more friendly feeling existing between the parties concerned.

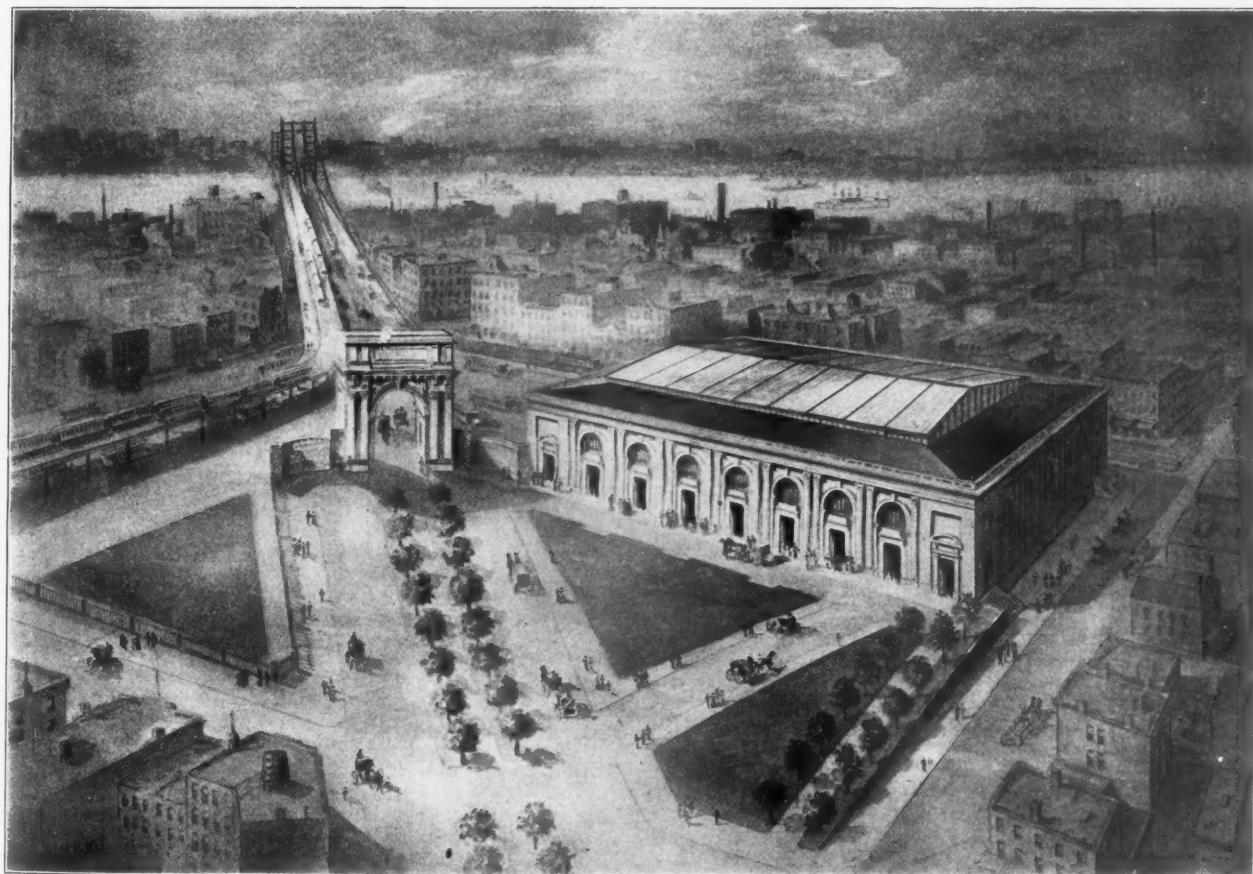
Terminals of the Manhattan Bridge.

The earliest designs for a bridge across the East river at the site of the Manhattan bridge provided for a central and unobstructed roadway in the middle of the bridge and in continuation of an extension of Flatbush avenue, and this has been persistently adhered to in all subsequent plans for the bridge. The width of the bridge was made 120 ft., including a central roadway 35 ft. wide, two spaces, one on each side of this roadway, for railroad tracks, these tracks to be placed in two stories, one above the other, and two sidewalks for pedestrians, one on each side of the bridge.

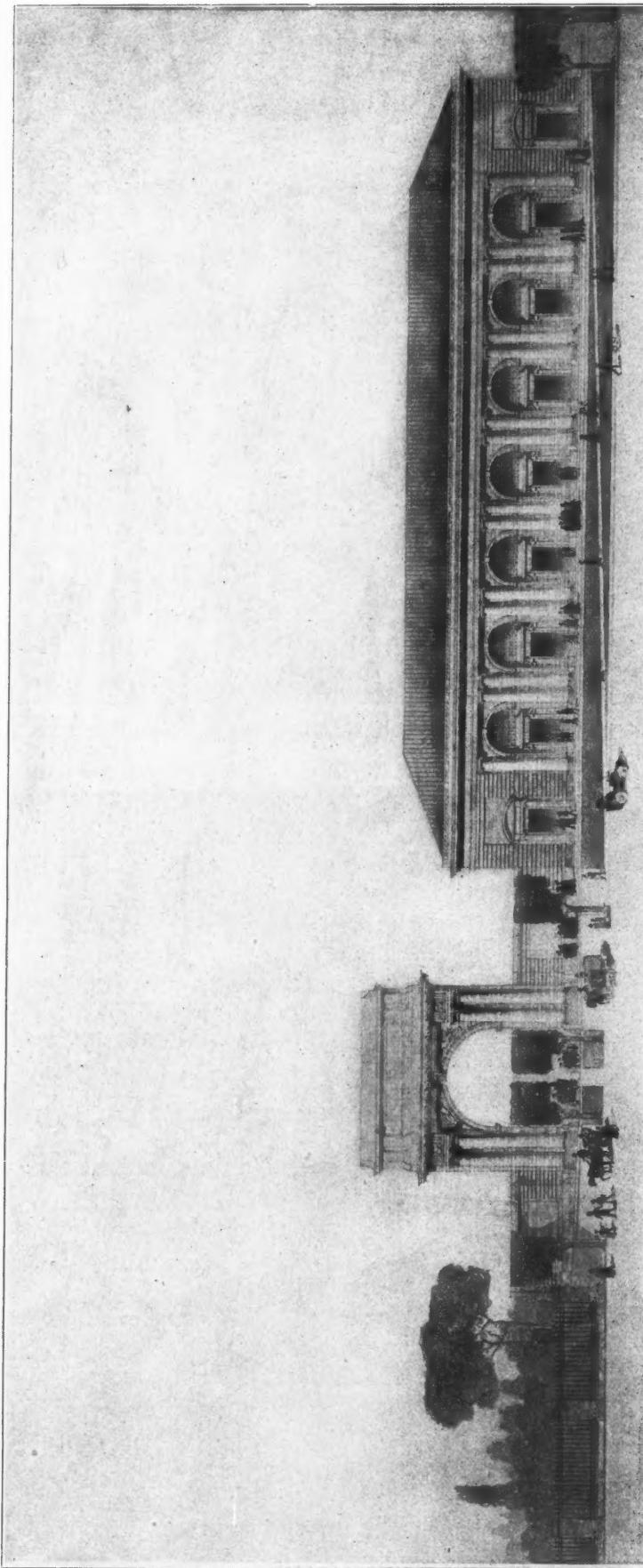
It was originally intended to use the two tracks on the lower or roadway floor for trolley cars alone, and the two tracks on the upper floor for elevated trains alone. It has since developed that the elevated tracks may not be extended beyond the terminals in Manhattan, and a subway route has been laid out by the Rapid Transit Railroad Commission through the Flatbush avenue extension, over the Manhattan bridge and through Canal street in Manhattan. The subway tracks can only be carried on the bridge with a grade of 5 per cent. at the terminals, and these tracks on the



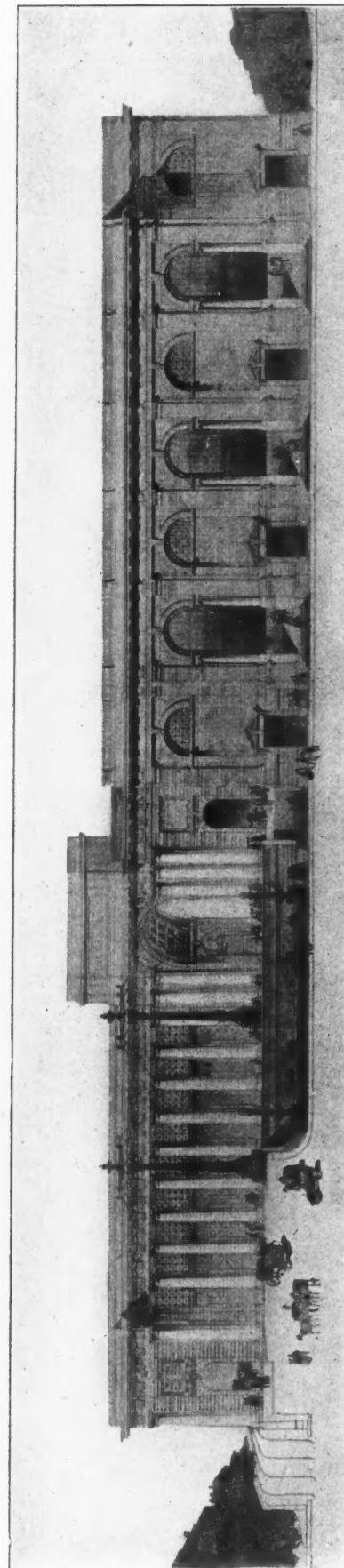
Perspective of Proposed Manhattan Terminal and Approaches of the Manhattan Bridge Over the East River, New York.



Perspective of Proposed Brooklyn Terminal and Approaches of the Manhattan Bridge Over the East River, New York.



Elevation of Proposed Brooklyn Terminal Building, Manhattan Bridge.



Elevation of Proposed Manhattan Terminal Building, Manhattan Bridge.

bridge must occupy a portion of the lower floor on the bridge since the grades to reach the upper floor would be prohibitory. The space on the bridge has therefore been divided as follows:

1. A central roadway 35 ft. wide.
2. Two footwalks, each 12 ft. wide, on the north and south sides of the bridge.
3. A double track subway line on the north tracks of the main floor for the Manhattan bridge route of the Rapid Transit Commission.

4. A double track trolley line on the south tracks of the main floor for Brooklyn trolley cars running to the Manhattan terminal.

5. A double track trolley line on the north tracks of the upper floor for Manhattan trolley cars running to the Brooklyn terminal.

6. A double track elevated railroad line on the south tracks of the upper floor for Brooklyn elevated railroad trains running to the Manhattan terminal.

The plans have been worked out as to lines and grades so as to furnish:

- (a) A central unobstructed roadway across the bridge.
- (b) Connections as above outlined for subways, surface and elevated railways.
- (c) Provision for the pedestrians crossing on the outside footwalks, which footwalks will terminate generally on the lateral streets and keep the pedestrians entirely away from the car and vehicular traffic.

The general idea of both the terminals is the same; to furnish masonry walls enclosing the terminals, bounded in Manhattan by the Bowery, Bayard street, Forsyth street and Canal street, and in Brooklyn by Nassau street, Bridge street, Sands street and Jay street.

The terminal building on the Manhattan side, which is on Bayard street and the end on the Bowery, will furnish on the ground floor an assembly room for persons about to take trains over the bridge, on the second floor 10 terminal loops for Brooklyn trolley cars, and on the third floor at least four tracks and five platforms for the elevated trains from Brooklyn.

The terminal building on the Brooklyn side, with its end on

principal features in which the railroad company's new rules differ from its old ones are as follows:

Shipments made by the United States Government will be accepted on a suitable certificate of an army or navy officer.

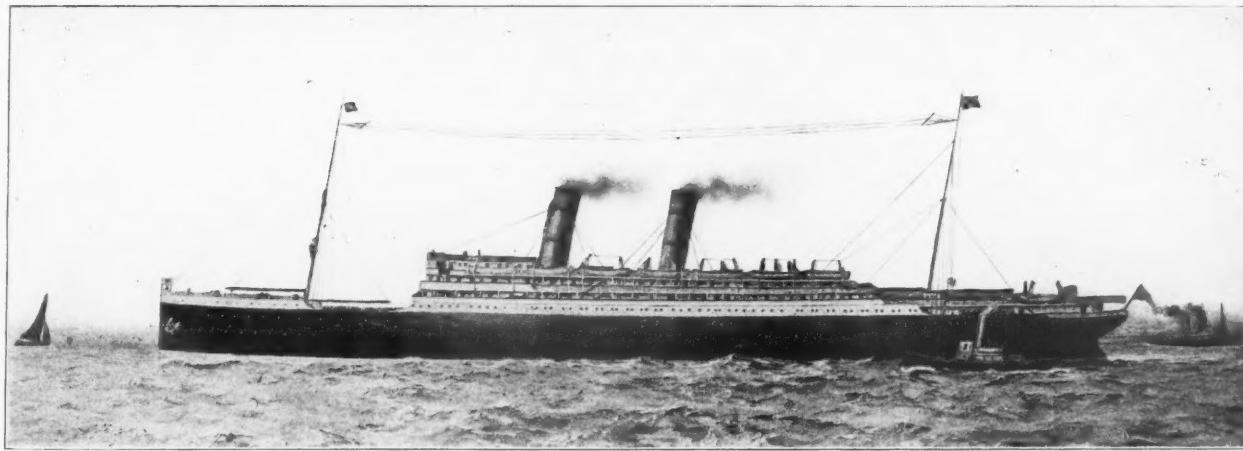
No limit is prescribed as to the quantity of explosives affected by the rules, or as to the day of the week on which shipments will be accepted.

The rule specifying the kind of cars says that steel underframe box cars of at least 30 tons capacity are "recommended." This is the language of the A. R. A. rules; in a railroad circular it seems to indicate that the decision as to whether or not a car is large enough or strong enough is to be made, not by a general officer but by the station agent. Full copies are given of the forms for the manufacturer's certificate as to method of packing, the shipper's certificate that the explosives are in the original packages, the United States Government certificate, and the certificate of the inspection of the car. The last is to be signed both by the agent or car inspector and by the shipper. Conductors must indicate on their reports to the car record office the position in their train of cars carrying explosives. The agent must deliver a special form to the conductor with the card waybill of each such car and every conductor, yardmaster, or agent, handling such a car must receipt for it on the proper form.

The limit of one car to a train is abrogated; there may be three cars, with five other cars between each two containing explosives. The requirement that two-thirds of the cars in the train shall be air-braked is omitted, as also the rule limiting the length of the train to 30 cars.

New C. P. R. Steamers.

On Nov. 1, the "Empress of Britain" was launched from the Fairfield yards, Glasgow, and will be followed in January by a sister ship, the "Empress of Ireland." These two vessels are to be used by the Canadian Pacific for a fast passenger and mail service from Liverpool to Quebec and Montreal, in the summer months, and to Halifax and St. John in the winter. They have



New C. P. R. Steamer, Empress of Britain.

Bridge street and its side on Sands street, will furnish five terminal loops for trolley cars from Manhattan.

The Brooklyn trolley lines may approach the bridge either through the Flatbush avenue extension or through Jay street, and pass along Jay street to the bridge. The elevated trains from Brooklyn will pass through Jay street or private property to the bridge terminal and pass on an upper level over the trolley tracks along Jay street to the bridge.

The entire terminals have been worked out with a view to appropriate architectural treatment, and will, it is believed, present in their open spaces and the architectural treatment of the buildings thereon ornamental as well as convenient terminals to the bridge.

Transportation of Explosives on the Pennsylvania.

The Superintendent of Freight Transportation of the Pennsylvania Railroad has issued new regulations for the transportation of explosives, the notice being numbered 174C and dated November 1. The new rules conform quite closely to those recently approved by the American Railway Association and they differ considerably in form from those issued by the road three months ago, and noticed in the *Railroad Gazette* of July 14, page 43. In substance, however, the new rules are very much like the old, as the code reported by the A. R. A. committee was based on the same general plan and theory and on the same statement of facts. The

a gross tonnage of 14,500 tons, are 570 ft. over all and 65 ft. beam, and are designed for a speed of 20 knots. The accompanying cut, from the designer's sketch, shows the general appearance of the boats. In 1903, the C. P. R. bought a fleet of 14 steamers from the Elder-Dempster Company, and has been maintaining a regular service from England to Canada, but this fleet is inferior in speed and passenger accommodations to the best steamers of the Allan Line, in the same service. The newest Allan boats, the "Victorian" and "Virginian," are three-screw turbines of 12,500 tons and 18 knot speed. The two Empress boats will therefore be 2,000 tons heavier and two knots faster than the Allan steamers, although they will be driven by reciprocating engines. They are scheduled to make the run from Liverpool to Montreal in six days. The cost of the C. P. R. boats will be approximately \$2,000,000 each, and they will have accommodations for 300 first class, 350 second class and 1,000 steerage passengers. They will complete the link of first class carriers to the far East under the C. P. R. flag, since the company has despatched the Empress of China, Empress of Japan and Empress of India from Vancouver to China and Japan for about 20 years, but has heretofore not been represented on the Atlantic by fast vessels. The beauties of the St. Lawrence route to Europe have been little known by Americans, because, until the Allan Line built the "Bavarian" and the "Tunisian," several years ago, there were no really good steamers in the service. The land-to-land distance, Straits of Belle Isle to County Donegal, is less than 1,700 miles, so that the new boats will be out of

sight of land for only four days, in making the passage. It is reasonable to expect that they will attract a large and profitable passenger business, besides the grain and other freight that already moves by this route. Who the Empresses of Britain and Ireland are, in real life, the company does not state.

Early Experiments with Smoke-Consuming Fire-Boxes on American Locomotives.

BY C. H. CARUTHERS.

Until the latter part of 1859, wood was the only fuel used on American passenger locomotives, and on a large number of those used in freight traffic, except on a few lines where anthracite coal was easily obtained.

Bituminous coal was used in a goodly number of the freight engines, but no effort appears to have been made previous to the year named, to handle it either in an economical or a cleanly manner. All that was required of a fireman was the physical qualifications necessary to shovel in the coal and "keep her hot!" Hence these engines using bituminous coal usually rolled along with a dense cloud of smoke and cinders pouring from the huge balloon stacks and spreading out over the fields and forests. If occasional breakdowns occurred to the wood-burners and necessitated the use of one of these lampblack factories to take a passenger train to the end of its run, this same black cloud of smoke and cinders bestowed its atoms liberally through the doors and windows upon the passengers and the crew and produced much coughing and sneezing as the grumbling occupants wiped the grimy streaks from off their faces and made "remarks" about the coal-burner. If an idea of using such fuel regularly in a passenger engine had ever presented itself to a railroad official, these occasional experiences no doubt retired it very promptly, for just at that time the spirit which was in George Stephenson to "mak' it wark," did not seem to possess American railroad men to a very great extent. Wood, however, was becoming scarcer and costlier, and the many advantages of bituminous coal as a fuel were becoming apparent, even under the careless manner in which

writer's notice, were made by the Pennsylvania Railroad Company in 1857 with two freight engines. One of these was a 4-6-0 with Phleger's patent boiler, built by R. Norris & Son in that year, and run by the company on a trial of 30 days and then returned to the builders. The other was a Baldwin freight engine, 4-6-0, which had just been rebuilt at the Altoona shops.

The Phleger boiler of the Norris engine, as will be observed by reference to the drawing, had the entire barrel filled with flues, and surmounted by a semi-circular casing containing the dry-pipe and forming an additional steam space. The drypipe entered the wagontop at the union of the latter and the casing named, and passed thence in the usual manner to the dome. At the front end, it left the casing and was divided into two parts, which were wrapped with an non-conducting substance and carried around the outside of the boiler to the steam chests. The firebox was long and shallow, and the crownsheet was dropped near the front end to form a deflector by means of which the smoke and gases were kept longer in contact with the flame; and a peculiar form of

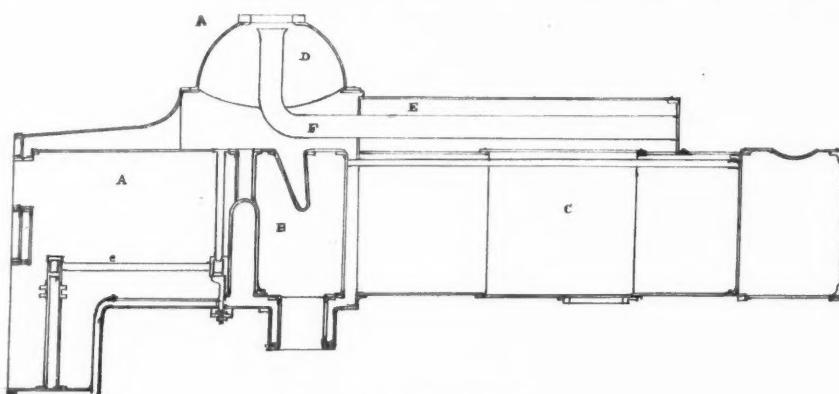


Fig. 1—The Phleger Boiler.
As built by Richard Norris & Son.

water grate and bridge-wall was used which, with the deflector, formed the front part of the firebox into a combustion chamber. The rear of the firebox was closed by two fire-doors which were supposed to be used alternately in firing. This boiler was 24 ft. long over all, and reveals the germs of features which have developed in a type of boiler quite popular at the present time,

such as the use of a large number of tubes, ample steam space at the dome, sloping firebox casing, and shallow fire-space with its accompanying advantage of enabling the entire firebox to be placed above the frames. The smokestack was straight and without spark arresters. The drawing accompanying this article was not made from the engine used on the P. R. R. but from a somewhat smaller one which contained the same arrangement of parts, except that a straight dome 30 in. in diameter was used on the Pennsylvania engine. This engine was purchased by the company soon after the trial mentioned, and was numbered 210, by which it will be designated in the remainder of this article.

The other engine was No. 120, and had a long firebox with a shallow fire-space, sloping crown and roof sheets, and had the rear of the furnace closed by four doors somewhat after the manner of the original Ross Winans "Camel" engine. An arch of fire-brick similar to that now used on locomotives was placed in the firebox, and no combustion chamber was used. The stack of this engine was also straight and without spark arresters.

In the annual report of the company for the year 1857, the Master Mechanic states that experiments with this engine show a saving in fuel of fully 30 per cent. below other engines of the class, and that the combustion is almost perfect and the annoyance from sparks and smoke almost obliterated. No especial mention is made of the results from the Phleger engine. In the report for the following year, however, he mentions that in addition to these two engines two more have been prepared for the better consumption of fuel and smoke—one, No. 190, having the Dimpel boiler, and the other, No. 206, having Gill & Co.'s patent firebox, and that these engines would all be put in order to undergo a thorough trial at an early date.

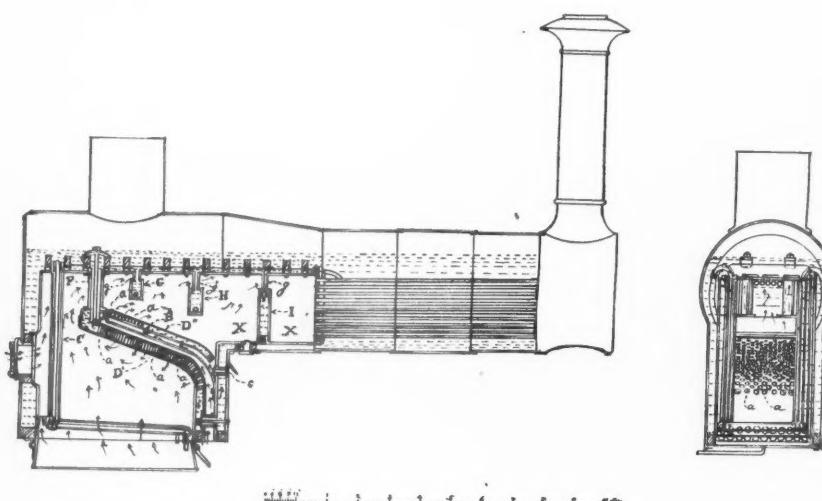


Fig. 2—Gill & Co.'s Coal-Burning Firebox, 1859.

it was used; so that some of the more progressive men who did their work upon the idea given in Tennyson's verse:

"I hold it truth with him who sings
To one clear harp in divers tones,
That men may rise on stepping-stones
Of their dead selves to higher things."

began to see not only a possibility of lessening the density of these objectionable clouds of smoke and cinders, but of making them an efficient factor in the economical production of steam. These convictions were probably further strengthened when this inky mass at times ignited at the top of the stack and streamed aloft in a plume of lurid flame.

The earliest attempts to properly consume the smoke and gases of bituminous coal in locomotive fireboxes which came under the

This trial began soon after and was conducted by W. J. Palmer, Esq., of the mechanical department of the company. The Master of Machinery, in his report for 1859, referring to these experiments, states that the results have been very satisfactory, and adds: "We are now satisfied that our rich bituminous coal can be used for all passenger and freight trains with great economy, and the smoke and gases heretofore so objectionable can be consumed in so complete a manner as to render the working in every respect more satisfactory than we have ever obtained from the use of wood."

In addition to the engines already named, there had been added to the number set apart for these experiments, No. 166, a Lan-

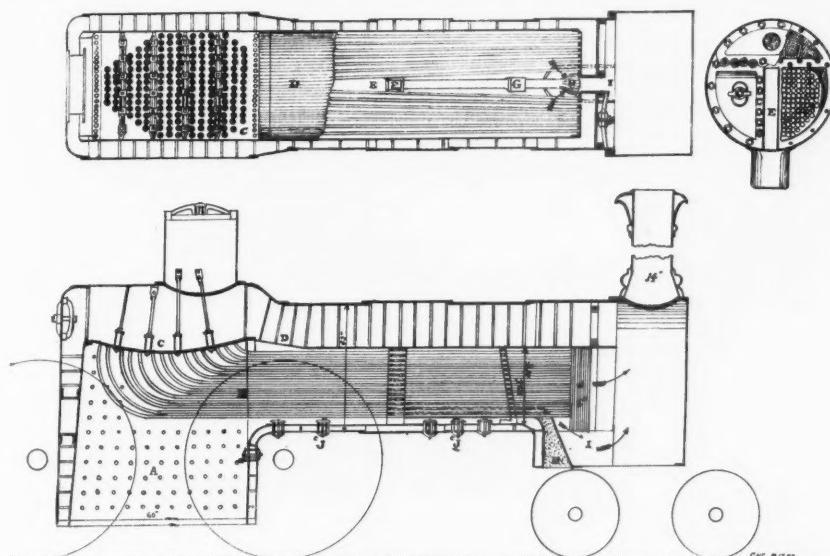


Fig. 3—Dimpel's Coal-Burning Boiler.
186 tubes, 1 1/4-in. outside diameter.

caster Locomotive Works 4-4-0 passenger engine rebuilt at Altoona with Gill & Company's firebox; No. 156, a new Baldwin 4-4-0 passenger engine with Smith's patent boiler; No. 136, a Baldwin 4-4-0 freight engine; and No. 51, a 0-8-0 Ross Winans' "Camel." This latter engine possessed no distinctive features for smoke-consuming aside from a long, deep firebox, and its use in the tests was probably more for purposes of comparison, although the results obtained from it were fair. It retained the odd Winans' stack with the surmounting square cinder box from which was suspended a long, cylindrical receptacle of the same diameter as the vertical part of the stack. The report referred to adds, "I am so well satisfied that the true secret of consuming smoke has been discovered and rendered practicable by the different inventors, that I have no hesitation in recommending the alteration of all wood-burning engines as fast as circumstances will permit," and in the same report reference is made to the performance of passenger engine No. 166 as follows: "Passenger engine No. 166 has been furnished with Gill & Co.'s improvement, and upon a recent trip over the western (now called the Pittsburgh) division with the express passenger train (note the word 'the!'), she was found to work clean, and caused less annoyance to passengers by sparks and smoke than is done by the regular wood-burning engines. Consumption of coal for the round trip was 6,736 lbs., or say 28 1/10 lbs. to the mile run over the heaviest portion of our line."

He adds, however, "The plan of Messrs. Gill & Co. includes a 'combustion chamber,' and this would necessarily involve considerable change in the present boilers. I think we can succeed in getting rid of the smoke sufficiently to prevent its being objectionable to passengers, without a combustion chamber (until the engines now in service require general repairs) at a trifling expense per engine, combustion chambers to be put in when renewals of fireboxes become necessary. We are now trying a firebrick deflector, forming an air chamber on the principle of Gill & Co.'s improvement, at the suggestion of W. J. Palmer, Esq. The results so far have been highly encouraging."

The following table furnishes the sizes of the principal parts of the engines used in these experiments.

No. of engine.	Cylinders.		Drivers.		Weight		Total cost per 100 miles.
	Diam.	Stroke.	No. Diam.	On drivers	Total, lbs.	lbs.	
51	19 in.	22 in.	8	43 in.	61,700	61,700	\$22.38
120	19 in.	22 in.	6	48 in.	70,000	55,000	8.64
136	17 in.	22 in.	4	56 in.	64,550	46,850	9.78
156	15 in.	24 in.	4	66 in.	63,900	40,500	15.34
166	16 in.	26 in.	4	66 in.	55,200	33,200	9.09
190	18 in.	22 in.	4	54 in.	61,900	36,900	11.86
206	19 in.	22 in.	6	48 in.	64,000	49,000	6.47
210	16 in.	24 in.	6	48 in.	64,700	45,745	9.86

The great variation

in the cost per 100 miles run is owing to the fact that in the case of Nos. 120, 166 and 206, no charge for repairs appears to have been made; and while this has been done in the case of the other engines, the amount appears to have in some instances included other than ordinary road repairs. The experiments of Mr. Palmer were very carefully conducted, all of the coal and water used having been accurately measured. It is greatly to be regretted that my copy of the published report of these tests has vanished with the flight of years, and deprives this article of some data which might be of more than passing interest. However, the author of the pamphlet writes that he is still interested in the subject and may yet obtain me a copy.

Reference has already been made to the Gill & Co. firebox. This device was patented on July 26, 1859, and the patent was numbered 24,867. The official drawing shows a firebox having a deflector, a combustion chamber, three hanging bridges, and a peculiar form of water-grate. The deflector was in the form of a letter U, having both stems slightly curved in the same direction, and was hollow, its walls forming a water space about 4 in. deep. The

sheets forming these walls were united by staybolts and short tubes, spaced at about the same distance as the staybolts of the firebox. The curved end of the deflector was placed about 15 in. in front of the fire-door, and a similar distance below the crown-sheet. Its stems were carried from that point, downward, at an angle of about 30 deg., until the under leg reached the mud ring,

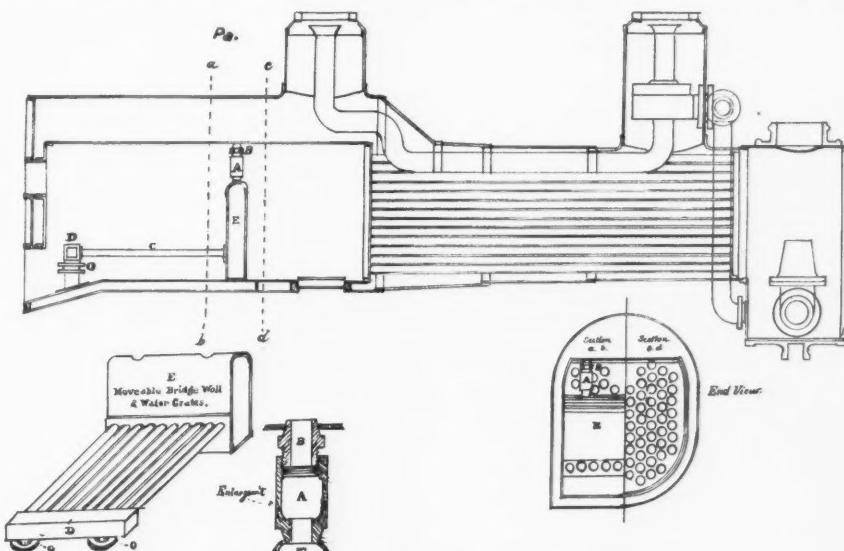


Fig. 4—Septimus Norris' Coal-Burning Boiler.

and was there attached to the firebox. The upper leg was shorter, and only reached to the throat-sheet, where it also was connected similarly to the other stem, from which it had been kept at a uniform distance of 6 in., and this intervening space was divided by a baffle plate to produce a more thorough contact of the gases with the flame before their entrance into the combustion chamber. This combustion chamber was a semi-circular extension of the firebox for a distance of about 36 in. into the barrel of the boiler. The front end of the extension formed the back tube-sheet. Between the tube-sheet and the curved end of the deflector, the hanging bridges were suspended from the crown-sheet; the smallest

at the rear, and the longest at the front end. Two columns, one on each side of the firebox at the rear end, inside, united the water-grate to the crown-sheet, and a smaller pipe was placed in each of these columns, having the lower end level with the top of the grate, but curved at the top and then carried forward at a short distance above the crown-sheet and terminating a few inches in

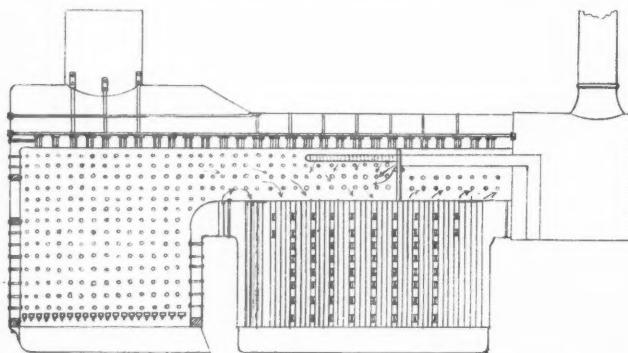
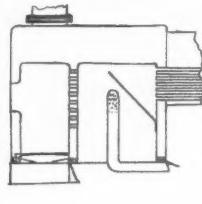
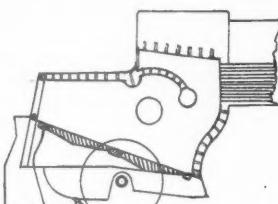


Fig. 5.—The Boardman Boiler.

front of the combustion chamber, at which point it was turned slightly downward. By means of this arrangement, a more perfect circulation of water was supposed to be maintained through the grate bars.

In a very economical use of fuel, an almost perfect consumption of smoke, and an absence of small particles of dirt, this Gill type of firebox gave most excellent results, and the Pennsylvania Railroad Company looked forward to the final equipment of all of its locomotives with the improvement. So perfectly was the smoke consumed, that even when several shovelfuls of coal were thrown into the furnace successively on heavy grades, only a comparatively small amount of smoke issued from the stack, and all traces thereof vanished after the fourth or fifth exhaust. Satisfac-

Fig. 6—Dewrance's Coal-Burning Fire-Box.
1846.Fig. 9—Craig's Coal-Burning Boiler.
Manchester, Sheffield & Lincolnshire Ry.

tory as the results were from the standpoints named, a new source of trouble developed after a large number of the engines were so equipped. Numerous complaints coupled with claims for damages from fires caused by the large cinders thrown out from these engines were sent in. To insure the necessary draught in fireboxes so filled with internal appliances, no cones, netting, or other spark arresters had been used, and the stacks were perfectly straight. To overcome this later trouble, John P. Laird, the new Master of Machinery at Altoona, designed a balloon type of stack containing a cone and some netting, and substituted it for the unobstructed straight stack. This obviated the trouble from fire to

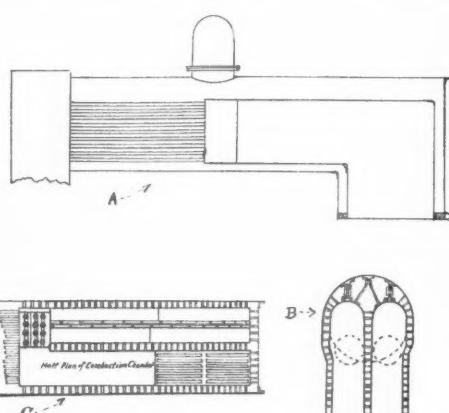


Fig. 7—McConnell's Coal-Burning Boiler, L. & N. W.

a great extent, but owing to the impeded draught it was found that the results were not quite as good as when the open stacks were used, but the traveling public was by this time becoming better accustomed to the use of soft coal in passenger engines, and but little complaint, if any, was made of the smoke. Considerable difficulty had also arisen from leakage in deflectors, hanging bridges, etc., and the result was the lengthening of fireboxes in new engines, and doing away with the combustion chamber and hanging bridges, while the wrought-iron deflector was replaced by the familiar firebrick arch which had been perfected after various experiments.

The Phleger and the Dimpfel boilers were also changed to the standard types, but the manhole, with its cover, was allowed to remain in the back head of the latter, and in the later years of service which the engine rendered on the road, proved a puzzle to the younger employees.

This Dimpfel boiler, as will be seen by the drawing, was of the water-tube type. The firebox was about of the ordinary form except that its front end formed a huge combustion chamber which reached to the usual position of the front

tube-sheet, and what are the flues of an ordinary boiler were replaced by water tubes which entered the waterspace at the front end, and were at their back end, curved upward and into the crown-sheet. An air pipe was carried from underneath the smoke arch into the combustion chamber, and other air openings were provided at several points along the barrel, and a manhole in the back head. This boiler is said to have steamed well and to have been a fair smoke consumer, but gave constant trouble on account of leaking and difficulty in carrying water.

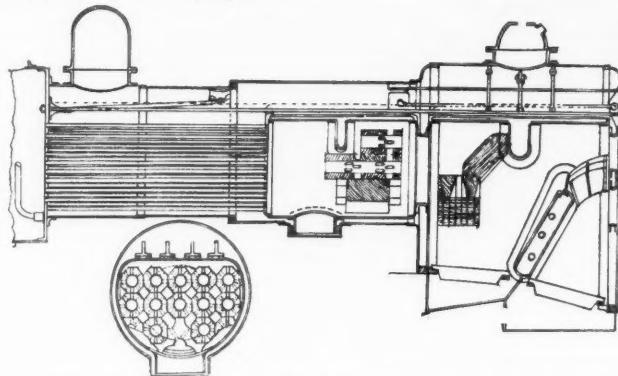


Fig. 8—Beattie's Coal-Burning Boiler, L. & S. W. Ry.

Two other types of smoke-consuming boilers came out about the same time as those already described, but I have never obtained any definite data as to roads upon which they were tried or the results of such trials. Both are shown in the accompanying drawings. One is the Boardman boiler in which the barrel was almost filled with a combustion chamber extending from the firebox to the smoke-box. Underneath, the barrel extended downward like another firebox, and this part was filled with vertical flues and had an air-tight ashpan covering its under side. A vertical partition in the combustion chamber caused the unburned portion of the gases to pass down through two-thirds of the flues, and then pass up through the other third on their way to the stack. Evidently this type of boiler required the use of eccentrics on a return crank attached to the main pin, as there could not have been sufficient room between the firebox and the fluebox to permit their use on the driving axle in the customary way.

The other type was that of Septimus Norris, and bears many earmarks of the Phleger boiler, of which it was probably designed to be an improvement. The removable grate and water bridge are certainly novel.

The other drawings show the boiler designed by J. Dewrance

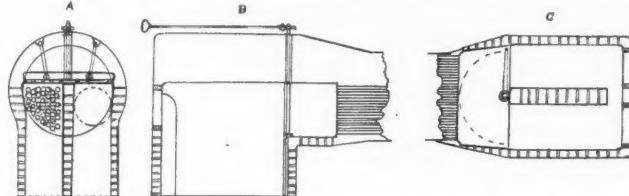


Fig. 10—Head's Coal-Burning Boiler.

in 1846; by J. McConnell, for the London & North Western Railway, in 1852; by Mr. Beattie, for the London & South Western Railway, in 1855; by Mr. Craig, for the Manchester, Sheffield & Lincolnshire Railway, in 1856; and by S. W. Head, for the Fitchburg Railway, in 1859.

The chief features of these last named boilers are, the transverse midfeather of Dewart's boiler and the deflector in the front part of the firebox so divided; the long combustion chamber of McConnell's divided by a midfeather; the deflectors, combustion chamber, firebrick arch, and firebrick tubes, of Beattie's; the deflector, and the strong resemblance of the firebox to that used by Ross Winans in his short firebox camel, of Craig's; and the longitudinal midfeather with regulating door of Head's.

A Novel Water Hoist for Deep Mines.

In the anthracite regions there are mines in which, for every ton of coal raised, as high as 14 tons of water must be pumped to the surface. A great variety of pumps and lifting devices have

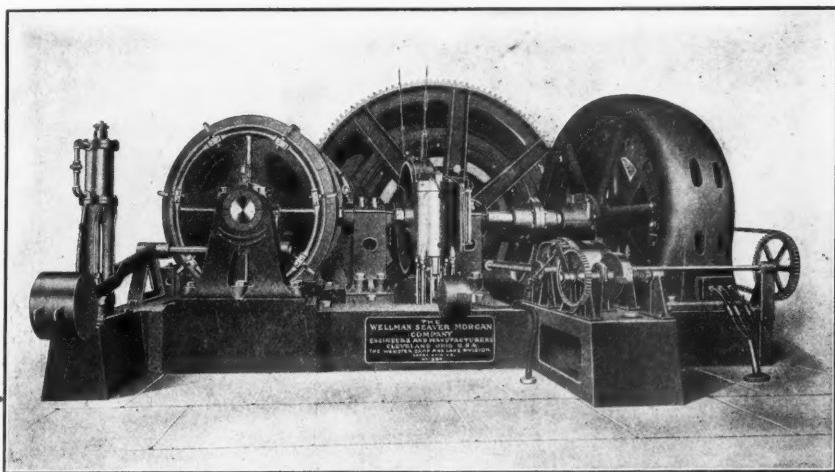


Fig. 1—End View of Hoist Drum, Motor and Clutches.

been tried, and the most satisfactory type for handling large quantities of water at comparatively low heads has proved to be large bailers operated by steam engines. These, however, lack mechanical regularity, as they are necessarily operated by men. The electrical engineer of the Delaware, Lackawanna & Western, Mr. H. M. Warren, recently designed a water-hoisting equipment for one of the company's mines which has all of the valuable features of the steam hoist and at the same time operates automatically. The mechanical details of the hoist and its automatic devices were worked out by The Wellman-Seaver-Morgan Company, of Cleveland, Ohio, and the electrical controlling devices were furnished by the Electric Controller & Supply Company, Cleveland, Ohio.

The original specifications of the D. L. & W. called for a hoist to be operated by an alternating current motor of 800 h.p. The problem of starting, stopping and reversing so large a motor had to be met at the outset. The duty to be performed by the hoist called for raising 4,000 gals. of water per minute to a height of 550 ft.; $4,000 \times 8.27 \text{ lbs.} = 33,180 \text{ lbs.}$; 550 ft. of 2-in. rope $\times 6.3 \text{ lbs.} = 3,465 \text{ lbs.}$; $33,180 \text{ lbs.} + 3,465 \text{ lbs.} = 36,645 \text{ lbs.}$ to be raised 550 ft. per min.

$$\frac{36,645 \times 550}{33,000} = 610 \text{ net horsepower.}$$

power. Weight of bucket = one-half weight of water, so that weight on rope = 53,235 lbs., or nearly 27 tons, requiring 2-in. steel rope.

It was decided that it would be impracticable to design the hoist other than to have a motor running continuously in one direction. This necessitated the use of friction clutches for accelerating and reversing the load. Several smaller plants were already in operation using a.c. motors on similar hoists, and as they were running successfully, and the repairs and renewals for clutches had not exceeded that required for other hoisting engines, it was decided to use this method.

Fig. 1 shows a side view of the hoist. The general arrange-

ment consists of a motor driving a pair of bevel wheels through a single bevel pinion. The bevel wheels run loose on a shaft and are fitted with Webster, Camp & Lane friction clutches. The operating mechanism for the clutches is so designed that only one clutch can be thrown in at a time, but both clutches can be out at the same time. Throwing in one clutch runs the drum in one direction; throwing in the other clutch reverses the motion of the drum. To the shaft on which the bevel wheels run there is keyed a pinion meshing with the main gear on the drum shaft. The drums are of the cylindro-conical type 10 ft. at the small diameter and 16 ft. at the large diameter. At a hoisting speed of 550 ft. per minute the drum makes about 15 r.p.m. There is one main brake located between the drums. All of the clutches and brakes are operated by auxiliary air cylinders fitted with oil cushion cylinders, the compressed air being furnished by a motor-driven air compressor located near to the hoist.

The hoist is controlled by a mechanical device shown in the illustration. This consists of a drum rotated by a friction drive from the motor through a sprocket chain. The drum shaft transmits its motion to a secondary shaft fitted with a variable speed gear which in turn operates a secondary stop. The main hoisting drum shaft operates a traveling nut which is so located with respect to the controller drum that at either end of its travel it releases a stop and allows the controller drum to make a quarter turn. This movement, through suitable electrical connections, operates the solenoids on the clutch valve, releasing the clutch and the solenoid on the brake valve and setting the brake. The further movement of the controlling drum is arrested by the secondary stop. This stop is released by the variable speed shaft and its connections, which has been given a predetermined time movement corresponding to the interval for emptying the buckets. The further movement of the controlling drum releases the brake and throws in the reversing clutch, thus starting the hoist in the opposite direction, and also starting the traveling nut on the controlling mechanism in the opposite direction. At the end of the hoist the cycle of controlling movement is repeated, making the hoisting operation continuous and automatic.

Every attention has been given to the safe operation of the hoist. The main brake is of the gravity type and to be released the current must be on the solenoid operating the valve so that air can be admitted to the underside of the brake piston. If for



Fig. 2—Head Frame of Hoist Showing Bucket Discharging.

any reason either the supply of current or of air pressure is interrupted, the valve drops, and the counterweights on the brake lever set the brake. The clutches are designed so that they are thrown out by weights. As is the case with the brake, either clutch can only be thrown in when the current is on the solenoid, and if either current or pressure fails, the clutch remains off. The motor shaft is fitted

with an emergency brake operated by a weight controlled by a solenoid, and any interruption in the flow of current to the motor sets the brake and stops the motor. A safety cut-out is provided for in the head frame so that in case a bucket is carried beyond the proper height the current is cut off.

Fig. 2 shows the head frame. It is 93 ft. from the base to the center of the sheave at the top. It is built of structural steel, roughly in the shape of an "A." From the head frame are suspended two buckets 6 ft. in diameter and 19 ft. 6 in. deep. The capacity of each bucket is 17 tons of water. In the bottom of the bucket are located two lift gates with an area practically equal to the cross section of the bucket. These gates are lifted automatically when the bucket reaches the top, and the water is discharged through the bottom into a spout fitted below the bucket, and which deflects it to either side of the shaft. Each bucket makes a complete round-trip in 1 minute and 50 seconds, the total lift being 555 ft.

The Surgical Department of the Chicago & North-Western.

The surgical department of the Chicago & North-Western was established in the early '70's and has therefore been in existence about 30 years. The headquarters in Chicago are located at 56 Kinzie street, on the north side of the tracks of the Wells street passenger terminal. As a matter of fact, the headquarters have been in this building since the formation of the department, but the space occupied has, of course, been enlarged from time to time as the railroad has grown. Further enlargement recently became necessary and new quarters were fitted up on the second floor of the building, the old ones having been on the first floor.

Before describing these new quarters, brief mention should be made of the organization of the department. Outside of Chicago headquarters, the arrangement accords with the general custom on American roads; that is, each division has its regularly appointed surgeons, selected from practitioners in the towns along the line. These are divided into two classes: district and local, each important point having its local surgeon or surgeons, while the district appointees are subject to call to any point within the district assigned to them. This does not mean, however, that the local surgeons are subject to the district surgeons. While a few of the foregoing are retained on a regular salary, the majority operate on a fee basis, being paid only for such work as they actually perform. All report to the Chief Surgeon at Chicago, who in turn reports to the General Claim Agent.

The department has arrangements with hospitals along the line to care for its patients. However, at Chicago headquarters, as has already been implied, facilities are provided for performing surgical operations and for the treatment and care of all but hospital cases. The quarters now occupied consist of two waiting rooms, an operating room, laboratory, a room for the examination of applicants for service and promotion, drug room, private office and two rooms for the doctor on service at night. This is more than double the space previously occupied.

A view of the operating room is shown herewith. It is 18 ft. x 24 ft., and is as well equipped as any hospital in the city for performing operations. The walls are white enameled tile 7 ft. high, the remainder of the walls and the ceiling being finished with white enamel paint. The floor is white tile. There is no woodwork in the room except in the doors and windows, which are painted with white enamel paint. The tables, cases and stands are white enameled iron and glass, and the chairs are white enameled iron. A large three-door cabinet is built into one wall, this and the other cases being dust-proof. The dressing table, seen on the right of the wall cabinet in the photograph, normally belongs against the wall not included in the view, and high above it is a marble shelf on enameled iron brackets, on which are four large bottles with different solutions for irrigating wounds. The double porcelain sink at the right has pedal cocks so that the surgeon need not use his hands to obtain hot or cold water after having prepared for an operation. The electric lights, which were not installed at the time the photograph was taken, include a six-lamp sunburst over the operating table, and adjustable extension brackets for the dressing table.

The laboratory will be equipped for urinalysis, microscopic examinations and similar work performed in such laboratories. The department distills its own water, having a still with a capacity of a gallon an hour and a 24-gal. reservoir. The laboratory also contains an electrically heated sterilizer and hot water tank, which are emergency apparatus in case of any difficulty with the gas apparatus ordinarily used. The laboratory room contains a large

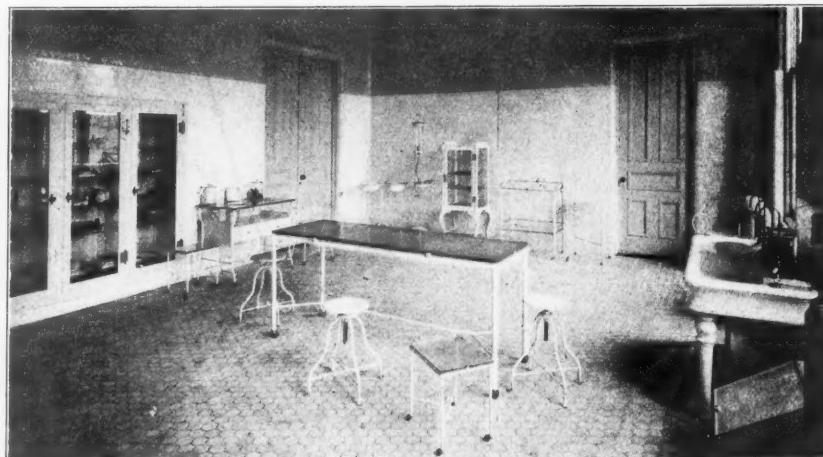
vault in which are kept stretchers, crutches and blankets and also the laboratory apparatus.

There is a large fireproof drug and record room, 24 ft. long by 10 ft. wide, fitted up like a vault, in which are kept all important records of the department and a full stock of drugs and supplies.

The room for examination of applicants for service and promotion is 22 ft. long by 12 ft. wide, with three large windows for ample lighting. The interior is finished in white, and the necessary equipment provided for making the examinations for vision, color sense, hearing, etc., prescribed for such applicants. Of the two waiting rooms mentioned, one is for these applicants and the other for patients for surgical attention. An elevator from the track level connects with the latter and a wheeled stretcher is kept in readiness at the bottom.

While the department at Chicago is intended primarily for cases from the Wisconsin and Galena divisions, it not infrequently happens that patients are brought there from points all over the system. In addition to employees, the department, of course, cares for persons injured on the road, in wrecks, etc. Besides the facilities at 56 Kinzie street, there is a department maintained at the large shops on the west side of the city known as the "shop dispensary," which is intended only for the treatment of injuries received in the shops, an assistant in the department being constantly in charge.

The surgical department is in charge of Dr. John E. Owens, Chief Surgeon. He has three assistants in Chicago, who give their



Operating Room in New Hospital Quarters of Chicago & North-Western, Wells Street Station, Chicago.

entire time to the work, Dr. J. D. Andrews being Chief Assistant. It is interesting to know that the department, during its more than 30 years, has had but two chief surgeons, Dr. Owens having been in charge since 1885. His predecessor was Dr. Ralph N. Isham.

The department for examination of applicants for service and promotion has 45 points on the line outside of Chicago where such examinations are made. It has been in existence ten years.

Washington Correspondence.*

WASHINGTON, Nov. 28.—It cannot be said that the Senate Committee on Interstate Commerce has made much progress during its sessions of the past week. There has been little more than an informal exchange of views on the part of the senators composing the committee. Some of the members of both parties seem to be disposed to wait until the President has submitted his formal recommendations in his annual message and then undertake to formulate a bill that will embrace these recommendations. While there is not much doubt as to the general character of the recommendations that the President will make, there is hope among some of the members of the committee that the text of the message may contain some suggestions that will be of assistance to those members of the President's party who trust that it may be possible to frame a compromise bill that will be satisfactory to conservative senators and representatives and not objectionable to the President.

The only member of the committee who has not thought it necessary to wait for suggestions from the White House before beginning active work is Senator Foraker. Probably no other member of the committee has given so much attention to the problem of railway legislation as has the senator from Ohio. He has very clear ideas as to what he believes ought to be done, and he came to Washington with a bill in his pocket framed to carry out those ideas. He has drawn up a bill that, in his opinion, would give to shippers prompt and effective remedies for unrea-

*During the present period of uncertainty about rate legislation, we will print weekly a brief statement of the situation.

sonable and extortionate rates and for rebates and discriminations of all kinds, whether obtained from the roads openly or covertly through the medium of private freight cars, private terminal roads, underbilling, or by any other device. At the same time that he is affording these remedies for shippers he has endeavored to protect the interests of the railroads.

The Foraker bill is being attacked principally on the ground that the proposition to require the courts to practically fix a reasonable maximum rate by enjoining the roads from charging more than might be found to be a reasonable maximum compensation for any given service, would be unconstitutional. Advocates of the bill, while contending that it would be held to be constitutional, attack the constitutionality of the proposition of the President to confer upon the Interstate Commerce Commission the power to fix either a maximum or an absolute rate. It is also contended that the Foraker bill avoids the constitutional questions as to whether the making of rates by an administrative body would be held to be the taking of property without due process of law, and whether it would not in many instances, unless the rates were made on the basis of a uniform charge per ton per mile, be held to be giving a preference to the ports of one state over the ports of another state.

As matters stand now, the Foraker bill is the only concrete proposition that has been brought forward, and current discussion is centered upon it. When it was first made public it was hoped by its advocates that it might be acceptable to the President as a basis of compromise, it being argued that it would give Mr. Roosevelt the substance of what he is contending for—an authority outside of the railroads to determine the reasonableness of a challenged rate and an effective method of promptly enforcing the substitution of a reasonable maximum rate for one found to be unreasonable. It soon became apparent, however, that it would not be acceptable to the President, and it now seems probable that it will be made the rallying point of most of the opposition to the carrying out of the President's exact recommendations.

J. C. W.

The Cost of Locomotive Operation.

XVII.

BY GEORGE R. HENDERSON.

CLEANING FIRES.

(Continued from page 467.)

This cost will depend not only upon strictly local conditions and the price of labor, but the quality of the fuel used. With coals that burn to a free ash, the cleaning of the fires will be confined to shaking the grate bars and hoeing out the ash pan—if the latter has drop bottoms or hoppers the process is extremely simple and brief. On the other hand, engines sometimes come in so badly clinkered that it may require a couple of hours to properly clean the firebox of slag and incombustible masses. This may not apply to all the engines coming in from their runs, for it is often claimed that by having two cleaning tracks, if an engine arrives in the condition above mentioned, the other engines giving less trouble can run around the difficult member, thus facilitating the work of turning. The process of cleaning is managed differently at various points. In some cases the hostler shakes or drops the fire into the ashpan, while the ash-pit man pulls it out of the pan; in others, a "fire-knocker" is employed to break up the clinker and push it into the pan. Occasionally, but not often, the pit man does this work, but the precise method depends upon the nature of the coal and the number of engines to be handled. Then, at times, the smoke-box must be cleaned of cinders, which may provide another operation. After this work has been done and the engine moved on into the house, the ashes must be taken from the pit.

This brings us to the construction of the pit itself. The old style were merely "pits," and all the refuse had to be thrown out over the rail, and into a car on a depressed track alongside. A more advantageous arrangement is the "elevated pit," where the ashes are simply raked out under the rail while the engine is still on the "pit," or is moving off, and pushed or thrown into the loading car without having to be actually lifted to any distance.

Then there are mechanical arrangements which lift buckets out of the pit and drop their contents into open cars, or elevate the ashes by an endless chain or buckets and place them in a bin, where they drop by gravity into cars, or take them at once to the waiting cars. This all varies the cost of cleaning fires, as the expense does not cease until the refuse is actually deposited at some point, though as there is generally demand for material for filling, and the hauling will benefit this work, the expense, as far as the engine is concerned, may be considered ended when the cars are loaded from the ash-pit.

It is likely that under average conditions one-half hour will be consumed by engines at the ash-pit, during most of which time two men will be engaged upon cleaning the fire and front end. If these men are paid 15 cents an hour, we will have the cost of such cleaning represented by this sum, viz., 15 cents. In many

cases the cost will be greater, in others less, so that the average will probably not be far from the figure stated. There may be so few engines that one man will not find his time wholly occupied with pit work, but it is then customary to provide him with other duties. If many engines arrive more men and facilities are needed, and mechanical devices in this line are more generally for the purpose of increasing the output than for diminishing the cost of cleaning fires.

Wiping.

This item is an exceedingly variable one, and it must be considered in connection with the local existing conditions. The practices in the method as well as in the amount are, perhaps, not alike in any two roads. Some of our most important railroads do little, if any, wiping of freight locomotives and not much of passenger engines. Even limited trains are sent out with locomotives that resemble mud balls, and the shape is all that distinguishes them as a piece of machinery. This is somewhat exaggerated, but filthy locomotives are too often the order of the day.

There are several reasons for this, and they are not hard to trace. When engines were small and were regularly assigned to crews, it was the duty of the fireman to keep the locomotive clean, and even to polish the brass work, of which there was a great amount. As the size and quantity of the power increased, there was a marked tendency to reduce brass work and polished surfaces of all kinds. This was the first reduction of the fireman's labors. As the engines still kept growing, and more surface had to be cleaned, the fireman's wiping was confined to the portion above the running board, and then to the inside and outside of the cab. Recently a number of roads have discontinued the practice of requiring the firemen to do any wiping on pooled engines, and also those of large size in assigned service, the men claiming (with some justice) that they did not have time to clean engines and obtain the necessary rest during lay-overs. When the wiping was done by the firemen there were no extra expenses attached, except the quantity of waste and cleaning mixtures used, which would, altogether, probably not amount to over 10 or 15 cents per engine cleaned. But now, when men have to be employed specifically for this purpose, the figure has increased, and in an effort to keep down costs comparatively little wiping is done.

The actual cost depends, of course, upon the price of labor, speed of workmen, and quality of work. The costs are variously stated at from 10 cents to \$2 an engine, so that little data can be obtained from such reports that could be used with any satisfaction. The writer calls to mind one road with which he was connected, where the wiping was done piece work. A contract was made with a gang leader to clean all the engines entering the house for 50 cents each, and he hired the necessary men and looked after them. These were mostly passenger locomotives, the largest having 20-in. cylinders, of the 4-4-0 type. The firemen were supposed (at that time) to clean above the running board, and the wipers took the wheels, pilots, front ends, tenders, trucks, etc., and the work was very well done—better, perhaps, than actually needed. Later this road relieved the firemen from all wiping.

We do not believe that satisfactory work of this kind can be done for less than 50 cents an engine, and very large ones will cost more. It would certainly require from three to five hours to do the work properly. Under the arrangement above mentioned, each man averaged three or four engines per day, so that fairly good wages were made at the work.

The writer has always favored clean engines, not for the benefit of appearance alone (although that has a certain commercial value), but for the greater opportunity of discovering defects that might later cause breakdowns on the road. With half an inch of mud on wheels, boxes, eccentrics, etc., it is almost impossible to discover incipient cracks, and if the wipers are careful they can prevent many an engine failure on the road. Indeed, some roads pay the wipers a bonus for discovering and reporting cracks, etc., and other roads promise promotion to the much coveted fireman's berth for careful examination and reporting of defects. Wiping not only furnishes a certain amount of inspection, but it greatly facilitates the work of the regular inspector, who is ordinarily paid better wages than the wipers.

Inspecting.

This item is about as irregular as the one last considered, and depends largely, if not entirely, upon the method of handling the engines. Where assigned crews and engines operate, few inspectors will be found, as the engineer is supposed to do his own inspection—in fact, he can hardly oil and look after the machinery day in and day out without knowing the condition of the engine in detail. It is true that engineers seldom know the link motion parts thoroughly, and there is some excuse for this. When engines arrive from a trip, they generally lie upon the "standing track" for an indefinite time, and the enginemen dislike to "worm" themselves between the wheels and the track, perhaps thick with mud, soil their over-clothes, and generally inconvenience themselves, instead of going to their homes. Some roads have built inspection pits, so that a man can easily get under the engine and examine all parts of the machinery, and these are very much to be com-

mended, though somewhat costly. It is a generally accepted proposition nowadays that if we wish a piece of work satisfactorily done, we must make it convenient for those who do the work.

When the inspection is performed by the enginemen there is no charge made for this work, and it practically costs the company nothing. When engines are pooled, however, one of the first industries to be organized is the inspection force, and few, if any, roads attempt to pool locomotives without having regular inspectors appointed. This is not so much with the idea of relieving the enginemen, as they are expected to report anything wrong on arrival, but it checks them up, makes them more attentive to this work, and gives some assurance that the engine is in proper condition for the succeeding crew. When engines are assigned, the engineman will naturally watch for defects so as to protect himself against failures on future trips, but when he may never see the engine again his main object is to get in from the current trip, and let the next man look out for trouble.

The cost of inspection, when done by special inspectors, varies considerably. It is often the custom to take some engineman who has been disqualified from road service on account of some physical misfortune, and give him the post of inspector. As he will expect to make some where near running wages, the cost of the work is apt to be high. Sometimes a machinist is put on this work, and obtains machinist's pay, which may be nearly as great as that of enginemen. Very often bright young men are selected, with promises of promotion if their work is well done, and in these cases the pay is much lower.

The length of time taken will depend upon the man—some will claim that they can inspect an engine in 15 minutes, but if it be done thoroughly, as it should be to be effective, it will take about double that mentioned. Some roads do this piece work, paying 10 cents for each engine inspected, but we believe a nearer figure will be 15 cents for the average case, where a special man or force is employed for this purpose.

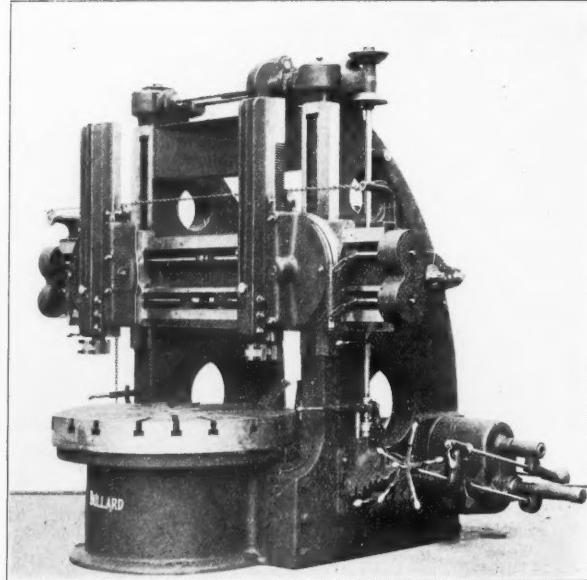
(To be continued.)

The Bullard 54-Inch Rapid Production Boring and Turning Mill.

The 54-in. boring mill illustrated herewith shows the latest development in boring and turning mills made by the Bullard Machine Tool Co., Bridgeport, Conn. Its actual capacity is 56 in. in diameter and 42 in. in height; the table, which is 52 in. in diameter, being driven by a large steel spur pinion meshing an internal gear at its greatest diameter. The drive is from a constant speed shaft, and 15 changes in table speed are obtained by a speed box, shown attached to the rear of the right hand housing in photograph, and a set of three reducing gears in the headstock, which is mounted on the bed between the housings. Any speed is instantly obtainable by the manipulation of the pilot wheel and lever shown above it. So completely is the centralization of all operating levers carried out that every movement or adjustment for the entire machine, excepting the left-hand head, may be consummated by the operator without taking a step. All speed changes are controlled by the pilot wheel and lever shown, as is also the quick-acting brake, all movements of these parts being interlocking. The pilot wheel operates the friction clutches in the speed box by turning, and it applies the brake by lifting. The brake can be applied only when the frictions are disengaged and it is rendered impossible to turn the pilot wheel while the brake is on. Similarly, the lever (behind the pilot wheel) controlling the changes in reduction gearing cannot be operated except when the brake is set, and it, in turn, locks the brake lever until a gear is fully engaged. While completely performing its function of safeguarding the driving mechanism from careless handling, this interlocking device in no way interferes with the rapid manipulation of the machine, a change from the highest to the lowest speed being made in a very few seconds. The speed changes being so readily obtained, the question of individual motor drive is materially simplified. The requirements are fully met by a constant speed motor mounted on a bracket between the housings. This bracket is designed so that if a gear or chain drive is considered preferable the motor may be suspended and gears or sprockets substituted for the pulleys.

The feeds are independent for each head and have 10 changes, ranging from $\frac{1}{32}$ in. to $\frac{3}{4}$ in. for each revolution of the table, and are readily changed by the levers shown on feed bracket. Rapid power traverse of the head and tool bar is obtained from the vertical feed rod, the cone frictions at its upper end being engaged by the horizontal lever shown at its lower end. In its central position the feeds are engaged, but by raising or lowering the lever the clutch is released and the cone frictions are brought into contact with a high-speed top shaft and the rod revolved at a high speed. The connection between the feed box and feed rod is a claw clutch arranged so as to engage in but one position, the rapid traverse may be used in thread cutting with no danger of a split thread resulting. The feeds are reversed in the feed box, so the position of the traverse lever bears a constant relation to the direction of movement in the head and bar, confusion in the mind of the operator being entirely obviated.

A notable feature in connection with the feeds is in the entire elimination of pull gears and crank handles at the ends of rods and screws; pull gears being replaced by gears constantly in mesh, and change from vertical to cross feed, or vice versa, being made by adjustable friction clutches operated by the lever shown projecting at the bottom of rail. This device multiplies many times the value of the rapid traverse and serves the purpose of a safety slip point in an otherwise positive train of feed gears, obviating all chance of breakage and delay through careless handling. Fine adjustments of the cutting tools are made by the double acting ratchet levers shown attached to the saddle. These ratchets automatically release their grip when actuating pressure is relieved. This device renders it possible for the operator to set the tool to the proper depth of cut or the diameter required at close range, and saves the time consumed in going to the end of the rail to make adjustments as in the case of the ordinary machine having crank handles. The construction of the rail is a feature which adds much to the rigidity and accuracy of the mill, as the entire weight of the head is supported by the bearing at the bottom of the rail, the upper bearing serving only to resist the tendency of the head to tilt forward under the pressure of the cut. The feed screw is directly in the center of the long, narrow, guide bearing, consequently there is no tendency to cant and bind on the rail. This principle of a guide bearing having a great proportion of length to width is also used in maintaining the alignment of the center stop on the rail, the rail being held central by a gibbed



The Bullard 54-in. Rapid Production Boring and Turning Mill.
block having its bearing in the recess in the face of the right-hand housing.

Another notable feature is the method of driving the top shaft which operates the rail lifting screws. The change in direction of movement is secured by tumbler gears, the driving pinion of which is cut in the end of a quill which is a running fit on the top shaft, the driving key being located in the middle of shaft in order to equalize the torsion between the ends. Special attention is given to lubrication. Both the head stock and the speed box are entirely enclosed and the splash system of oiling is used, the gears running in a constant bath of oil. All high-speed shafts have ring or chain oiling boxes and gages are placed so as to indicate the amount of oil in each. The angular thrust bearing of the main spindle is entirely immersed, oil pockets in the bed insuring ample lubrication of its entire surface, while a felt ring feeds oil to the vertical journals. The thread cutting attachment is not a part of the regular equipment of the mill, but may be applied at any time with no further change than the substitution of extension studs for the bushings in the feed bracket on the rail. The net weight of this machine is about 17,500 lbs.

Disastrous Rear Collision at Baker Bridge, Mass.

In a rear collision of westbound passenger trains at Baker Bridge, Mass., on the Fitchburg division of the Boston & Maine, 18 miles west of Boston, on Sunday evening last, about 8 o'clock, 16 persons were killed and 32 or more seriously injured, most of the 16 killed being passengers in the two rear cars of the leading train. The wreck took fire from the coals in the firebox of one of the two locomotives of the second train, and many of the victims were burnt. The flames spread so rapidly that it was impos-

sible to know whether the victims were killed by the collision or by the heat, or suffocation caused by the fire. The leading train was an accommodation for Marlboro, leaving Boston at 7:15 p. m., and a few minutes behind time. It had just started from Baker Bridge station. The train which ran into it was the Rutland express for Montreal, consisting of two engines and nine cars. The reports indicate that at Lincoln, one mile east of Baker Bridge, the express was only about one minute behind the preceding train, and it appears to have run into the way train at full speed. The President of the road issued a statement on Monday, saying:

"While no complete and thorough investigation has yet been possible, every part of the appliances for stopping the express train seems to have been in perfect order, and the train should have easily made a stop at any time within a distance of 1,500 feet. All of the testimony as yet secured shows that the express passed by at least two and probably three block signal lights and three red fuses without paying the slightest attention to them. * * * The engineman of the leading engine was not seriously injured, but no statement from him is forthcoming.

Engineering Contracts.*

The dividing line between specifications and contracts is most difficult to draw, for in any particular case two engineers will rarely agree as to what clauses pertain properly to the specifications and what to the contract, of which the specifications form a part. Some engineers prefer to throw nearly everything into the specifications and thus keep the size of the contract proper as small as possible, while others make the latter very extensive by including in it many clauses that are ordinarily found in the specifications. Again, others make a practice of repeating in the contract certain clauses that have already been covered in the specifications. In my opinion, the last mentioned method is open to criticism in that it is liable to result in conflicting clauses; nevertheless, it is quite possible that my practice has not been entirely free from this objectional feature—it is so hard to be always consistent; and again, one's methods are a matter of development and are not created perfect at one essay.

Before proceeding to the direct treatment of my subject I shall endeavor to make clear the method that I have adopted for locating the dividing line between specifications and contracts. I say "endeavor" advisedly, for I am not sure that I can always give a satisfactory rule or reason for any particular division; because absolute consistency is an attribute that, strive as one will to attain it, lies ever just beyond reach.

My preference is to throw as much of the matter as possible into the specifications and reduce the size of the contract proper to a minimum, avoiding repetition of statement in the two parts of the work, but of necessity treating certain subjects in both parts, though from different points of view. There is no doubt about the proper place for most of the topics or headings, but in certain cases there are plausible reasons for locating them in either division. All clauses that relate to methods of construction, qualities of materials, character and excellence of the work, rules limiting the functions and powers of the contractor and defining the authority of the engineer, directions to bidders, and transportation of men and materials unquestionably belong to the specifications; but such clauses as those relative to adherence to specifications, alteration of plans, damages, extras, payments, responsibility, for accidents, the spirit of the specifications, strictness of inspection, liquidated damages, scope of the contract, and time of completion might perhaps be properly inserted in either division. My custom, however, is to include all of these clauses and others of like character and scope in the specifications.

Nine out of ten of the contracts that an engineer has to prepare are in connection with construction, and an intelligent specialist soon learns how to prepare satisfactory specifications and contracts for all ordinary kinds of work; but this style of contract is by no means the only type with which an engineer is concerned, for he is sometimes called upon to draft agreements between promoters of enterprises and capitalists, between himself and promoters of enterprises, between two engineers, between two contractors, or between a bond company and a contractor. Some of these unusual types are exceedingly difficult to draft properly, as, owing to their varying conditions, they cannot be systematized. It is mainly with them, therefore, that this lecture on contract writing is concerned; because for construction in general it is practicable to evolve a form which, when correctly filled out, will apply to any ordinary case.

Before one can draft a contract, he must have clearly in mind a full and well defined idea of all the conditions and *desiderata*, and he should epitomize these systematically before beginning to write. It is advisable to keep constantly in view the possibility that each party to the contract may be unscrupulous and willing

to take every possible advantage of every weakness which the contract may contain and which will tend to his own profit—honor and integrity to the contrary notwithstanding. Failure to do this will often result in some ambiguity that will cause rank injustice to one of the parties to the agreement. It is difficult for an engineer to recognize this weakness of human nature and to bear it steadily in mind when writing contracts; because the training and the work of engineers tend to develop in them to an eminent degree the principles of absolute honesty; consequently, it comes hard for them to be forced to make a practice of doubting the integrity of their business associates. To mistrust the motives of one's fellow men is disagreeable but essential, if the writer of specifications and contracts is to protect himself or his clients from loss and fraud.

Concerning this matter I speak from sad experience, for my business career has taught me the necessity for exercising the utmost caution in drawing contracts, so as not to put temptation in the way of either party by inserting a single clause of which he could take advantage by compelling the other party to do something that was not contemplated when the agreement was made. Occasionally it happens that after a contract is executed, one of the parties finds a flaw that will give him an improper advantage; and it is only a strictly just and upright man who will refuse to avail himself of such a weakness in the document.

The essential elements of any contract, according to Mr. John Cassan Wait, the noted authority on "Engineering and Architectural Jurisprudence," are as follows:

"1st. Two parties with capacity to contract.

"2d. A lawful consideration: a something in exchange for its legal equivalent, a *quid pro quo*.

"3d. A lawful subject-matter, whether it be a promise, an act, or a material object.

"4th. Mutuality: a mutual assent, a mutual understanding, a meeting of the minds of the parties."

Without these four elements no contract is binding in law.

The essentials of a well-drawn contract that comes within the province of the engineer, however, are as follows:

1st. A proper and customary form.

2d. A full and correct description of all parties to the agreement.

3d. A thorough and complete preamble.

4th. A statement of when and under what conditions the contract is to become operative.

5th. The limit, if any, for duration of contract.

6th. An exhaustive statement of what each party to the contract binds himself, his executors, administrators, successors, or assigns, to do or to refrain from doing.

7th. A clearly defined enunciation of the consideration which each party is to receive—this is the essential *raison d'être* of the instrument.

8th. The forecasting of all possible eventualities that would materially affect the agreement, and a full statement of everything that is to be done in case of each eventuality.

9th. Penalties for failure to comply with the various terms of the agreement.

10th. Provision for possible cancellation of contract.

11th. Provision for settlement of all business relations covered by the contract or resulting therefrom in case of cancellation, taking into account all possible important eventualities.

12th. Mention of the place where the agreement is drawn or of the place where it is to be put in force, so as to show the state under the laws of which the validity of the contract is to be determined, should suit be necessary to enforce it.

13th. Methods of payments, if any are to be made.

14th. Provision for extra compensation and the limitations connected therewith.

15th. Provision for possible changes in contract.

16th. Provision for transfer of the contract or for sub-letting.

17th. Provision for settlement of disputes.

18th. Provision for satisfactory and sufficient bond, if any be needed.

19th. Provision for defense of lawsuits, if such provision be necessary.

20th. Definition of names used in contract such as "Engineer," "Company," "Contractor," or "Trustee."

21st. Dating of contract.

22d. Proper signatures with the necessary seals, if the latter be required.

23d. Witnesses to the signatures, or execution before a notary public.

I shall now take up and discuss in the order of their enumeration each of these essentials to a properly drawn contract.

1st. The styles of opening clause for contracts are both numerous and varied, and it is difficult to say which is the best. Each writer naturally will have one favorite style and will adhere to it whenever possible. Mine for many years has been as follows:

MEMORANDUM OF AGREEMENT, made and signed this eleventh day

*Extracts from a lecture before the students of Rensselaer Polytechnic Institute, by Dr. J. A. L. Waddell, reprinted from *The Polytechnic*.

of February, 1905, by and between the Kansas City Bridge & Terminal Railway Company, a corporation of the State of Missouri, the party of the first part, and sometimes termed in this agreement and in the specifications the "Company," and The Western Contracting Company, a corporation of the State of Kansas, the party of the second part, and sometimes termed in this agreement and in the specifications, the "Contractor."

Wait recommends the two following forms of introduction:

This agreement, made and entered into this eleventh day of February, in the year 1905, by and between, etc., etc.

Articles of Agreement, made and entered into between The Kansas City Bridge & Terminal Railway Company, a corporation, etc., etc., and The Western Contracting Company, a corporation, etc., etc., on this eleventh day of February, 1905.

After the introductory clause comes the preamble, and immediately after it I insert in capital letters "NOW THIS AGREEMENT WITNESSETH," and follow with consecutively numbered clauses that embody all the terms and conditions of the contract, then close with provision for the signatures and seals of the contracting parties and witnesses to these signatures.

2d. In describing the various parties to an agreement, care should be taken to make the description full and convincing in order that there shall be no possible mistake concerning the identity of each party. This is effected in the case of an individual by stating his occupation and place of residence, in the case of a firm by naming it fully, mentioning its place of business, and describing the kind of partnership, and in case of a company by giving its legal title and the name of the state or country where it was incorporated. In case of a partnership it is sometimes well to specify whether it is general or special in respect to the work covered in the contract.

While most contracts are drawn between but two parties, it sometimes occurs that an agreement will involve three or even more. Such a contract is much more complicated and difficult to draft than one between two parties only.

Each party should be designated in the instrument by his special number, as the party of the first part or the party of the second part; and in addition it is well to give each another designation, such as "Contractor," "Company," "Owner," "Engineer," "Promoter," "Board," "City," "Incorporator," or "Trustee" in order to avoid the use of too many words throughout the document, as would be the case were he always referred to as the party of the first or second part. In order to make assurance doubly sure it is well in some cases to define the terms "Contractor," "Company," "Engineer," "Promoter," etc., at the end as well as at the beginning of the document. In any case these explanatory clauses should be placed at the beginning or the end of the specifications, because the latter are often used without the contract being attached.

There is no strict rule as to the order in which the several parties shall be placed, but it is customary to make the one who pays the money the party of the first part. In case of employer and employee the employer should come first. In other cases it is a good rule to put the most important party first and the others as nearly as may be in the order of the importance of their relation to the enterprise or object matter of the agreement.

There is a consideration of primary importance in contract writing that is sometimes overlooked, viz., whether the parties to the agreement are legally entitled to enter into contract. For instance, in the case of a company, the president or general manager, or perhaps either can sometimes legally contract in the company's name, but sometimes he cannot, in which case, if haste be essential, it would be proper to have him enter into and sign the contract and afterwards have it formally approved at a meeting of the board of directors. A properly certified copy of the board's approval should subsequently be attached to the contract. Access to its charter and by-laws is generally necessary to determine who has authority to enter into and sign contracts for a company.

In contracting no corporation can exceed the limit of its powers as given by its charter. If it attempts to do so, its act will be *ultra vires* and without effect; consequently it behooves one in writing a contract with a corporation first to study well its charter, articles of incorporation, and by-laws.

Contracting with unincorporated organizations as parties, such as associations, clubs, societies, or congregations, is a precarious business; nevertheless it often has to be done. In order to ensure the payment of money obligations by such parties a sufficient sum should be deposited in advance in the hands of a reputable trustee with instructions to pay it to the proper party or parties as soon as the obligations covered in the contract have been met. Otherwise, the other contracting party is liable to lose his entire consideration, because it is very difficult to hold legally an organization that has no legal existence, even if all the members thereof be individually liable. Here again I speak from sad experience, for at the outset of my consulting practice I lost what I considered then a large fee by dealing with a committee of public spirited citizens, who were not honest enough to pay their just debts after the proposed enterprise had failed. Even the law did not enable me to collect the bill, as my lawyers did not present the case to the court in the proper manner.

Again, any person under 21 years of age, termed in law an infant, who enters into a contract, has the privilege of repudiating it after arriving at the age of maturity, in case that it does not redound to his advantage; consequently it behooves the writer of a contract to make sure in all doubtful cases that the contracting parties are of age. In engineering contracts, however, this question is seldom likely to arise because very young men are not often concerned in a prominent way with important enterprises.

Similarly, imbeciles, inebriates and lunatics are incompetent, and contracts made by them are legally voidable at their option. While it is highly improbable that either an imbecile or a lunatic would ever be made a party to an engineering contract, it is not impossible that a man chronically addicted to the over use of liquor might be so concerned. Such a man might plead that he was under the influence of drink when he signed the document and thus possibly effect his release from its obligations, consequently the writer of an engineering contract should assure himself of the temperate character or at least of the sober condition of the parties thereto.

A married woman in some states cannot contract, sue, or be sued in her own name. While it is uncommon for women to be engaged in enterprises involving engineering, it is by no means impossible, as I have learned from a hard lesson; for in the case of a contract for the engineering of a large and novel enterprise that I entered into with a certain man, it transpired that he was acting as agent for a married woman. Before our work was finished the man died, and the woman gave us notice in writing that she would assume his share of the contract, and instructed us to finish our work. This we did, and she paid us one-half of our total fee; but before the date specified in the contract for the payment of the second half, the bottom dropped out of the scheme, and the lady then refused to make any further payment. She did not plead her married state as a justification for her refusal; but we knew what we might expect in a legal contest over the question, consequently we entered the balance on the wrong side of our ledger in the "Profit and Loss" account.

In case of war a contract entered into between parties who are subjects or citizens of the conflicting countries is illegal, and if war be declared subsequent to the signing of the contract, its obligations cannot be enforced by law until after the war has ceased. As engineers are often interested in projects in foreign countries, this is a matter that needs to be borne in mind when preparing the contracts for such enterprises.

When a contract is entered into by an agent, care should be taken to make this relationship both clear and legal in the document by stating the name of the owner or corporation and following it with the words

"acting by and through Mr. X., Agent, Attorney, Engineer, President, or Treasurer (as the case may be), by virtue of the authority vested in him through power of attorney of the (here name the individual or company) dated the day of, 19..., a copy of which is hereto annexed."

or in some similar and equally explicit manner. In this way the name of the real principal is made certain, the authority of the agent is preserved, and the possible liability of the agent as the principal is averted. It must be remembered that no claims or obligations against a principal are created by a contract entered into by an agent who acts without proper authority, unless the contract be afterwards confirmed directly or indirectly by the principal.

Much engineering work is being done and is to be done in the future by contract with the United States Government. In making such contracts it is important to note that although the Government may enter suit on its contracts for their enforcement, it cannot, without its own consent, be sued for non-compliance therewith. Instances are not unknown of repudiation of contracts by governments. Furthermore, public officers cannot be held personally liable for contracts signed by them in their official capacity.

The names of the parties in the body of a contract should correspond exactly with the signatures and seals at the end, for a variation might prove fatal to the validity of the document.

3d. The preamble is a most important portion of any contract. It should explain fully all the whys and wherefores of the agreement and its *raison d'être*. A thorough explanation of these would often render clear the intent of a clause in the body of the instrument that is otherwise ambiguous.

Once more I am speaking from sad experience, for in an important but hurriedly prepared contract one of the clauses was not drawn with sufficient clearness, and, in consequence, one of the parties to the agreement tried to take an unfair advantage of it. Had the preamble explained carefully and in detail the ultimate object of the contract and the various steps necessary for its accomplishment, the said party would not have been able to make the claim he did.

4th. Every contract should contain a statement of when or under what conditions it is to become operative. The date may be some particular day of month and year or immediately after or some definite time subsequent to, some act or occurrence, such as

instance, as the giving of written notice, or the deposit of a certain amount of money in a certain place, or the completion of a certain piece of work, or the arrival of a railroad at a certain point. Whatever the "condition precedent" may be, it should be made clear in the document beyond the peradventure of a doubt.

5th. Too often in contracts nothing is said concerning the duration of the agreement or of how it is to be drawn to a close. In some cases it would be impracticable thus to limit the life of the contract; but in others it is not only practicable but also advisable, and sometimes it is imperative, especially where a bond for proper completion of work is involved.

6th. The statement of what each party to the contract binds himself, his executors, administrators, successors, or assigns, as the case may be, to do or to refrain from doing should be thorough and complete in every detail. The importance of this is self-evident, nevertheless it is a point that is not always given proper attention in contract writing.

In all contracts between corporations or between a corporation and an individual, the promises to perform should be made binding upon the successors or assigns of each corporation, although it is probable that the law would enforce this even if the stipulation be omitted.

In contracts where an individual is a party to the agreement it is best to bind not only himself but also his executors or assigns, unless, perchance, the obligation be of such a nature as to be non-transferable, as, for instance, the performance of personal duties or services of an expert nature or involving special skill. Thus an engineer's services are not transferable, unless some special provision be made and agreed to by both parties that, in case of his death or inability for good and sufficient reason to finish his work, his contract is to be assumed by some other engineer either named or to be determined afterwards in some specific way. But the death of one member of a firm of engineers will not cancel an agreement; for as long as one of the original members of the firm remains in charge the contract will hold. In other words, it would require the death or incapacity of all the original members of the firm to abrogate the contract, unless special provision to the contrary exist in the written agreement.

Construction contracts are generally assignable, unless they contain provision to the contrary.

7th. The consideration which each party to an agreement is to give and is to receive should be clearly and fully stated in the document, otherwise unsealed contracts are liable to be held valueless and void in law. Moreover, the consideration must be real, substantial, and adequate. Some lawyers make a practice in many cases of specifying a consideration of one dollar, and they even try to pass that dollar around among the several parties to the agreement by having each party make nominally that payment to each of the other parties so as to show that each receives a valuable (?) consideration. In my opinion, such a practice is mere humbug and unworthy of adoption by any man pretending to scientific attainments in his profession, no matter whether that profession be law or engineering. Its adoption, it seems to me, is *prima facie* evidence of weakness in the document and a confession by its writer that he has failed to make evident the true consideration that each party is to receive and the real reason for each party's entering into the agreement.

There may be some excuse for passing the dollar in case of a parent deeding property to his child, where the true consideration is love and affection; but a dollar does not constitute a real consideration—it would be insufficient usually to pay the cost of typewriting the document, hence its employment is a fiction and a farce.

8th. No portion of the work of contract writing requires greater experience and ability than the forecasting of all possible eventualities that would materially affect the agreement and the proper provision for what is to be done in the case of each eventuality. All contracts are more or less faulty in this particular, for it wou'd require omniscience to forecast all future happenings; nevertheless, in preparing an important contract one should endeavor to foresee and provide for all possibilities and probabilities. The lawyer or engineer who makes a practice of giving this important matter full consideration in every contract that he writes will soon find himself in demand by capitalists to aid them in making their investments and in consummating their enterprises.

9th. The matter of penalties is one that has to be handled with gloves, for the law is very jealous of its rights and prerogatives, and deems that it alone is authorized to specify and enforce a penalty, which it interprets as a punishment for failure to perform or comply with the terms of an agreement. On this account it is better not to use the term "penalty" in any contract but to employ instead that of "liquidated damages." In my practice I have a clause in construction specifications that reads as follows:

"For each day of delay beyond the date set in the contract for completing the entire work herein outlined, all in accordance with the plans, specifications, and directions of the Engineer, the Company shall withhold permanently from the Contractor's total compensation the sum of dollars,

and the amount thus withheld shall not be considered as a penalty, but as liquidated damages, fixed and agreed to in advance by the contracting parties as a proper compensation to the Company for the loss caused it by such delay."

Liquidated damages are but seldom enforced, owing mainly to the characteristic good nature of engineers; for they object to taking advantage of a contractor who has worked faithfully but has been unfortunate. Again, the fact that the sympathy of jurors is generally with the working man and against corporations is a reason why disputes involving the retention of money to compensate for delays are generally settled out of court.

10th and 11th. In most contracts for construction and in some other types of contract there is no need to provide for a possible abrogation of the agreement, because the completion of the work involved is a natural cancellation; but in some other types, such, for instance, as partnership contracts that continue indefinitely, full detailed provision should be made for annulment at any time. Great care should be exercised to describe fully how all current business matters are to be closed and what compensation is to be paid to the other party or parties by the party who desires the said cancellation. To do this in a satisfactory manner will require business knowledge and ability of the highest order.

12th. It is quite important in many contracts to state where the instrument was executed and where it is to be put in force, notwithstanding the fact that the residence of each party in case of individuals or the state of organization in case of corporations has been described in the introductory clause of the document. The laws governing a contract may be determined by the place where the contract was made or by that in which it is performed. Wait treats this question very thoroughly on pages 49 to 51 of his *Engineering and Architectural Jurisprudence*.

13th. Methods of making payments under construction contracts are generally covered in the specifications, where, in my opinion, they properly belong, although I have on several occasions been adversely criticized for not putting a payment clause in the contract proper. In all other types of contract in which payments of money are involved, full provision should be arranged for the exact manner in which all payments, both partial and final, are to be made. This remark applies with special force to contracts involving engineering fees; for in these, if payments on account are not arranged for, there is a chance that the engineers will receive no compensation at all until after the completion of their work, and this might be delayed for an indefinite period. Our usual practice is to ask one-half of our fee upon the completion of the plans and specifications and the other half in monthly payments proportionate to the amount of contract work done on the construction, so that when the latter is finished we shall have been paid in full. We have learned to provide also that we are compensated properly for all extra expense to us due to failure to complete the work in the time specified. It has cost us many thousands of dollars to learn this lesson, consequently the hint ought to be valuable.

14th. In construction contracts the subject of extra payments also belongs in the specifications, although in many cases it is covered in the contract proper. Our standard clause for this item reads thus:

"No extras will be allowed, unless they be ordered in writing by the Engineer. For extras so allowed the contractor will be paid the actual cost to him plus ten (10) per cent, for profit. Satisfactory vouchers will be required from the Contractor for all extra labor and materials."

15th. It is a wise precaution to provide for making changes in every important contract. Our standard clause for this item is as follows:

"No change or alteration shall be made in the terms or conditions of this agreement without the consent of both parties hereto in writing; and no claim shall be made or considered for any extra work, unless the same shall be authorized and directed in writing by the Engineer."

16th. In construction contracts there should always be a clause to govern assigning the contract and sub-letting the work. Our standard clause for this reads thus:

"The party of the second part hereby agrees that it will not assign or sublet the work covered in this contract, or any portion of it, without the written consent of the party of the first part; but will keep the same within its control."

17th. In respect to provision for settlement of disputes engineers are somewhat at variance. Some think that the Engineer should be the sole arbiter, but I do not believe that such an arrangement is just, savoring, as it does, altogether too much of autocratic rule. I am a firm believer in arbitration for the settlement of all disputes on important matters, and it has for many years been my custom to provide in all construction contracts for such a method of settlement. Our standard clause for this matter is as follows:

"The decision of the Engineer shall control as to the interpretation of drawings and specifications during the execution of the work under them; but either party shall consider itself aggrieved by any decision, it may require the dispute to be finally and conclusively settled by the decision of three arbitrators, the first to be appointed by the party of the first part, the second

by the party of the second part, and the third by the two arbitrators thus chosen. In case that the two first chosen fail to agree upon a third, the latter shall be appointed by By the decision of these three arbitrators or by that of a majority of them, both parties to this agreement shall be finally bound."

The person chosen to appoint the third arbitrator should be some prominent official such as the judge of a certain court, the mayor of a certain city, or the governor of a certain state.

It is seldom that an arbitration clause in a contract is utilized, because engineers as a rule are reasonable. Only once in my 30 years of practice has it been appealed to. The subject of dispute in that case was some lumber very properly rejected by my inspector as unfit for use. Unfortunately, the result of the arbitration was adverse to my decision, owing to a too friendly understanding between the officers of the company and the contractor.

Notwithstanding the fact that the contract reads that "By the decision of these three arbitrators, or by that of a majority of them, both parties to this agreement shall be finally bound," the law has decided that the losing party has still a right to appeal to the courts; consequently this clause of our form of contract is not binding. Although I have known this for years, I have made no change in the clause for the reason that at least nine contractors out of ten prefer arbitration to the delays, uncertainties, and expense that are inseparable from legal litigation, and I have never heard of a case in which the loser by arbitration appealed to the courts. It would simplify matters if immediately after an arbitration is agreed upon, each party concerned were to give to the other a bond guaranteeing that he will abide by the decision of the arbitrators.

18th. The bond question is a prominent feature of any construction contract and occasionally is important in other types of contract. My firm has finally come to the conclusion that a good surety company bond is the only kind that we shall either ask for or accept in future, for no other kind is so satisfactory to the company or is obtained with so little difficulty by the contractor. All personal bonds are obtained by favor and they are generally very unsatisfactory, for the solvency of the sureties is difficult to prove, and to enforce payment is still more difficult. Many years ago I had my first and last experience with a personal bond. It was when building my residence that I accepted from the contractor a joint bond signed by three or four persons, among them a good friend of mine. This bond was accepted by my lawyers, nevertheless, later on when the contractor threw up the work I found that the only responsible man on the paper was my friend. As I could not press him, I waived the matter, and in consequence was materially out of pocket.

There is considerable humbug in connection with sureties to agreements, for a slight change in contract, plans, or specifications is often sufficient to render the bond null and void. If anyone doubt this statement, let him read what Wait says on pages 13 to 17 of his *Engineering and Architectural Jurisprudence*. In my opinion, the only way to protect the company is to insist upon having a bond that will permit of all necessary changes in plans and specifications without releasing the surety, and even such a bond might be avoided by the law's declaring it illegal because it departs from current practice.

There are some very strange things about the law. On two or three occasions I have been provoked to make the statement that "laws are made to protect rogues against honest men," and truly it does seem sometimes as if such were the case. Law and equity are two entirely different things. The less that engineers have to do with the former and the more they employ the latter, the better it will be for all concerned.

In adjusting disputes I am a firm believer in the principle of compromise, or, to put it in more homely words, in that of "give and take." It is nearly always practicable to bring two disputing parties to terms by suggesting a reasonable compromise.

19th. If, according to a contract, the contractor is to indemnify the company against all liability or damages on account of accidents, it is only fair that the former should be given the privilege of assuming the sole defense of all lawsuits arising from such claims.

20th. The manner of defining by special clauses names used in the contract, such as "Engineer," "Company," etc., will be seen by an examination of any standard form of contract.

21st. A contract can be dated either in the opening or in the final clause or in both. In the latter case it is better not to repeat the date but to insert the sentence "Dated the day, month, and year first herein written."

22d. It is important that the signatures coincide exactly with the names of the parties as given in the opening clause of the agreement, and that proper seals are attached when they are needed. If a party to a contract be a corporation, its corporate seal should be used, but in the case of an individual almost any kind of seal will suffice—either a wafer or the word "seal" with a scroll drawn around it with pen and ink being commonly used. In the latter

case it is better to write in small letters the initials of the signer over the word "seal."

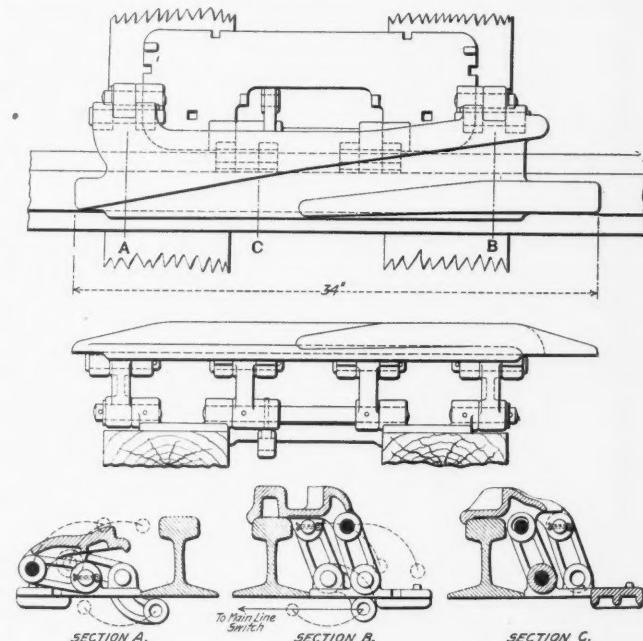
Let me here call your attention to an important and fundamental difference between contracts with and without seals. The former do not need to have a consideration mentioned in them in order to make them valid, while the latter do require such mention. In former times there was far greater difference in the importance of sealed and parole (or unsealed) contracts than there is to-day; for then a sealed contract could not be modified without taking many formal legal steps, while to-day it can be changed quite readily by a short supplementary contract, provided there be a proper consideration mentioned therein for the making of the change.

23d. Where the party to a contract is a corporation, the proper witness to the company's signature is the secretary of the company, who should use its corporate seal for attesting the document, but in case the party is an individual any witness will suffice.

The best possible witness to signatures is a properly authorized notary public; because if any doubt be expressed concerning the authenticity of the said signatures, all that is necessary is to prove the notary's authority, which is a matter of public record, while for all other witnesses it is obligatory to search for them and either produce them in person or prove that it is impracticable to do so on account of death or departure from the country; and in this case it is generally required that there be brought forward reliable parties who will swear that the witnesses' signatures are authentic.

A New Design of Derailer.

The derailer illustrated herewith was invented by Mr. George L. Mansfield, Mechanical Engineer in the engineering department of the Chicago & Alton. The primary object of the designer was the production of a derailer whose out-of-service position will be below the plane of the top of the rail. The method by which this is accomplished is pretty clearly shown by the drawings. The de-



The Mansfield Derailer.

ailer is supported and moved by two pairs of links, arranged as shown. The inner pair is connected to the main line switch. The upper pin holes of this pair are larger than the pins and are given a cam surface, as shown in section at C, to impart a lifting motion to the derailer in order to clear the top of the rail. The sectional views show the derailer with a lip fitting over the inner rounded corner of the rail head. This is a precautionary feature designed to guard against any possibility of movement sideways under load. But as the position of the links and the relation of the parts is such that it is practically impossible for this to occur anyway, as the load would have to be raised in order for it to do so, the device is made with or without the lip, as desired.

The material is malleable iron, with the possible exception of the pins, which may be either of steel or turned malleable iron. The weight is about 8½ lbs. The height of rail to which the derailer is to be applied determines the length of the links, of course.

The Mansfield derailer is handled by the Locomotive Appliance Company of Chicago.





GENERAL NEWS SECTION

NOTES.

The train-staff system is to be put in use on the Duluth, South Shore & Atlantic between Negaunee and Eagle Mills, four miles.

The Southern Pacific, the Atchison, Topeka & Santa Fe, and the San Pedro, Los Angeles & Salt Lake have notified their eastern connections that after this year they will not carry a special tourist conductor with any tourist sleeping car.

In the United States Court at Cincinnati, November 22, Judge Thompson upheld an order of the Interstate Commerce Commission declaring unreasonable an advance in the rate on soap L. C. L., which had been made by four of the principal roads leading out of Cincinnati. The complainant was the firm of Proctor & Gamble.

Press dispatches report that, to appease the complaining drummers in the state of Michigan, the Michigan Central, the Lake Shore & Michigan Southern, the Wabash, and the Grand Rapids & Indiana are to issue individual thousand-mile tickets at a flat rate of \$20. This ticket will be interchangeable within the state of Michigan over the roads named and will also be accepted between Grand Rapids and Chicago and between Michigan points and Toledo.

By an order recently issued, 108 U. S. mail clerks running between Cleveland and Syracuse over the Lake Shore and the New York Central are required to run through between Cleveland and Utica, about 53 miles farther. The New York and Chicago mail route over these roads is divided into three sections—New York to Syracuse, Syracuse to Cleveland, and Cleveland to Chicago—and the new order is designed to relieve the men on the New York end who, it seems, have had an undue share of the work. From the report in the *Utica Observer* it appears that the intention is to have the trips of the clerks overlap, so as to facilitate the transfer of the work from one crew to another. About 300 mail clerks now begin or end their runs at Syracuse.

Hackmen Defeated in U. S. Supreme Court.

At Washington, Nov. 27, Justice Harlan handed down the opinion of the Supreme Court of the United States in the case of Donavan, Callahan and others against the Pennsylvania Co., affirming the decision of the lower courts that cab drivers and hotel runners of Chicago who seek to secure access to the Pennsylvania station in that city for the purpose of soliciting business have no right to do so. The decision holds that if the railroad company is not fairly treating its patrons it is for the patrons and not the hack drivers to complain. The opinion also sustains the right of the railroad company to name the owners of carriages who may enter its premises; this privilege, instead of being a monopoly, is merely the exercise of a proper discretion for the protection of patrons; but the hackmen were within their rights in standing on the sidewalks adjacent to the station.

Great Northern's "Oriental Limited."

The Great Northern passenger train leaving St. Paul at 10:30 a. m. daily for the Pacific Coast will in future be known as the "Oriental Limited," and handsome new cars have been built for it. Eight trains of eight cars each are required to maintain this service. The new compartment observation cars are 82½ feet long and contain four staterooms, a card room and a drawing room. The sleepers are of the same length and have 16 sections. The coaches are 81 ft. long and seat 84 persons. The dining car is lighted by lamps incased in cathedral glass, those overhead being in square frames and those on the sides resembling ancient lanterns.

Opening of the Philadelphia Subway.

The first section of the Philadelphia Rapid Transit Subway under Market street from the Schuylkill river to Fifteenth street will be opened for traffic on December 15. Only surface cars will be run in the tunnel at first until the elevated road on West Market street is completed. Cars will be switched over at Fifteenth street for the return trip, pending the completion of the City Hall loop. Five lines of surface cars will be run in the tunnel, each alternate car on these lines continuing down town on the surface tracks. The opening of the new line is expected to greatly relieve the congestion on Market street, west of Fifteenth street.

The Washington State Railroad Commission.

The State Railroad Commission has made an excellent start toward justifying the expectations of those who successfully advocated the creation of such a body. A hearing at Colfax has revealed a number of serious abuses, and in its order directing the railroads

to re-establish joint freight rates, the commission has done all that was within its power to correct these evils. The railroad officials were themselves surprised at the extent to which abuses had grown up in this state. The general counsel for the Great Northern candidly admits that the traffic men are not infallible; that "a rule or practice may grow up based on local conditions or emergency periods, and when the emergency has passed the practice is maintained; that railroads are liable to get into ruts in the conducting of their business, as are other business concerns." As a result of the Colfax hearing, many people in western Washington who have been opposed to the creation of a railroad commission, and a great many others who were apathetic because of a belief that there were no evils to right and a commission could not right them if there were, will now see the question in a new light. The business interests of Seattle, who always looked coolly upon the commission cause, are among the first to derive substantial benefits from the commission law.—*Spokane Spokesman*.

English Railway Amalgamation.

The Great Central, on Nov. 10, concluded arrangements for purchasing the Lancashire, Derbyshire & East Coast, a 55-mile section feeding important centers. The Great Northern negotiations for the purchase of this line failed.

System.

One of the railroads centering in Chicago is about to introduce an innovation in the collection of fares. Hereafter a "train auditor" will follow the conductor on his rounds. When the conductor collects a fare the auditor will examine it, enter the amount in a journal, and if change passes he will also make a note of that fact, so that every transaction may be complete.

It is thought that this is only the beginning of a revolution in the method of collecting train fares. In the not distant future the passenger who has settled himself in his seat, and spread out his newspaper, and is beginning to enjoy the real comforts of American railroad travel, will be approached by an avant courier, who will say:

"Kindly fill out this blank, giving your name, age, address, business or profession. State whether you carry any life or accident insurance; also whether you have ever been summoned to sit on a jury; also write in the proper place whether or not you are subject to any of the diseases referred to in this circular. Kindly have all this ready when the train statistician passes through."

The obliging patron does as directed, when the statistician approaches, takes up the filled forms, and asks:

"What is your gross and net income? Have you ever been divorced? Did you ever have a fire? Please name a few persons of prominence to whom we may address some confidential inquiries regarding your personal habits."

All of these requests having been complied with, the conductor appears:

"Do not move, if you please," he says, "while I am taking a snapshot for the company's files. Will you please empty all your pockets, so that I may know whether or not you have anything on your person by which you may be identified in case identification becomes necessary? You say this is your ticket. Is there anybody on the train who can identify you? No? Then please sign the following affidavit."

Then comes the auditor, who courteously remarks:

"I see that the conductor has interviewed you and passed on. Will you relate to me as nearly as possible everything that occurred between you, for the company's records?"

Having complied with this reasonable request, the corporation's notary public next appears:

"You swear," he asks, "that this is your signature and handwriting, and that all the statements made here are true to the best of your recollection and belief? Thank you, that is all."

Then the division superintendent appears:

"Will you do me the favor," he asks, "to tell me as briefly as possible everything that has happened to you since you entered this train; give me the number of your ticket, the amount of money you handed the conductor and the amount audited by the auditor, if you paid cash, and such other information as you think might be of value to the company."

All of this having been arranged, the general superintendent comes along:

"Will you do me the favor," he asks, in a gentlemanly manner, "to report any inattention on the part of any of our employes, and to tell me whether you ever do business with the scalpers? Thank you."

Then comes the treasurer of the corporation:

"Excuse me for troubling you," he says, "but I am picking up

a little information which may be valuable to us in the preparation of our quarterly, semi-annual and annual reports. Have you ever been addicted to the use of alcoholic liquors, to cigarettes, to railroad whist? Would you be willing to swear that you saw the conductor hand the ticket or money you gave him to the auditor? Did you observe anything peculiar in the manner of any of our employees, anything that might excite your suspicion? Thank you. Kindly keep your present position for a few moments longer. The directors are coming in and these will be followed by the preferred stockholders, who will be followed by the mortgage bondholders. We are determined to make this line popular."—*Chicago Inter-Ocean*.

The Recent History of Federal Control of Railroads in the United States.*

BY W. M. ACWORTH.

(Continued from page 162.)

I may pass very briefly over the exertion by Congress of the police power in the matter of interstate commerce, both because it is of less importance, and because it has less interest to us in England. I need only say that a series of Safety Appliances Acts passed in 1893, 1896 and 1901 require all railroads engaged in interstate commerce to equip their rolling-stock with automatic couplers and continuous brakes, and to report all accidents occurring, to the Commission.

The Act of 1887, with the amending Acts dated 1889, 1893 and 1903, forms the code under which Federal regulation of railroad rates has been in operation now for 18 years. How has the system worked? That the general situation has immeasurably improved is beyond question. Before 1887 the state of things was such as an Englishman accustomed to the decorous, law-abiding methods of his own railroads, can hardly imagine. Tariffs were, indeed, nominally published, but the published rates were for the small fry only. A big trader obtained his rates by bargaining with the railroad, or, better still, by bargaining with the several competing companies. And the bigger the trader, and the better at driving a bargain, the lower were his rates. For a trader to obtain a specially low rate from Company A, by a false assertion that Company B had offered to give it, was apparently a recognized business transaction. Rebates off the nominal rates were given by all sorts of fraudulent devices; the weight of goods consigned was falsely understated; compensation was paid for the loss of goods that had never existed; the cashier of a merchant was appointed canvassing agent for the railroad company, and paid a handsome commission on all the business he introduced, and so forth. And bad as the position was, it seemed hopeless to improve it. In more than one instance railroad managers of high position, men of unchallenged integrity in their personal character, came forward at official inquiries and gave evidence that they had been forced to give secret preferences as otherwise their line would have been left with no traffic to carry.

Nor was this all. Small and non-competitive places were being handicapped out of existence. The rate for the 1,000 miles from Chicago to New York was perhaps half the rate charged from a point half way along the road. And it did not end here. For any day a rate war might break out, and, while the local non-competitive rate was maintained at the normal figures, the Chicago-New York rate might be cut within a week to half, a quarter, an eighth of its normal amount. Business was pretty much of a gamble, and a gamble with loaded dice.

The passing of the Act of 1887 was welcomed by everyone as putting an end to a situation that had become intolerable. In the phrase of President Hadley, "the railroad men stood up so straight that they were like to fall over backwards." But alas! Utopia is a long way off, and the way thither is steep and difficult, and with not a few turns where the road seems for a time to be leading in the opposite direction. Before long the inherent difficulties of the situation reasserted themselves. For one thing, the giving of a rebate was punishable by two years' imprisonment in the penitentiary. And no one, either trader or rival railroad manager, could be found to give evidence that might land a railroad freight agent, who in his private capacity was a respected and virtuous citizen, in jail. (The penalty of imprisonment has been repealed since 1903.) There was another difficulty. There were, for instance, between New York and Chicago ten or a dozen possible routes, differing widely in length and in general efficiency. If the rate was the same by all roads, the two or three strongest roads would take all the traffic. If the inferior roads published a lower rate, the strong roads immediately reduced theirs to the same figure. Before the Act this difficulty had been dealt with, not on the whole unsuccessfully, by agreements sometimes for pooling the traffic, sometimes for a division in specified proportions of the total receipts therefrom. But pooling agreements had never been enforceable at law. The Act of 1887 made them actually illegal.

The railroad men bitterly complained that the Act simultane-

ously required them to abolish discrimination, and deprived them of the only machinery which they had found efficacious for the purpose. For years an agitation was carried on for the repeal of the anti-pooling section of the law, and gradually almost all thinking men, including Judge Reagan, the author of the section, were brought round. Bills more than once all but got through Congress. But the mass of the American people are as little open to reason on the question of pooling as the English public on the question of "favoring the foreigner." And pooling still remains illegal.

Even this is not all. In 1890 Congress passed "an Act to protect trade and commerce against unlawful restraints and monopolies," commonly known as "the Sherman Act" or "the Anti-Trust Act," which declared every contract or combination in restraint of trade illegal. While this Act was passing through Congress, it was apparently agreed on all hands that it was not intended to, and in fact did not, apply to railroads. Unfortunately in two famous cases, the Trans-Missouri Freight Association case in 1897 and the Joint Traffic Association case in 1898, the Supreme Court of the United States—though only by a bare majority—decided (1) that the Act did apply and (2) that under it a traffic conference for the purpose of agreeing rates is illegal. The penalty under the Act for an illegal agreement is a fine of £1,000 and a year's imprisonment.

English railroad men will wonder how under these conditions rates can ever be fixed, still more maintained. Congress and the Supreme Court would seem to have combined to establish in perpetuity what one of the judges from the bench in a more recent case described as the *bellum omnium contra omnes*. But the American railroad mind is eminently resourceful. The Traffic Associations have been formally dissolved. What actually happens at present is, I imagine, something like this. The traffic officials of the various lines meet, discuss the situation, and express their views. Finally the representative of the line primarily interested announces as a fact that may be of interest to his colleagues that he proposes to make such and such a rate. And when, next day, the rival lines file new tariffs at the office of the Interstate Commerce Commission, it turns out that they are identical with the tariff which the leading railroad announced its intention of adopting.

Nor is this all. The inducement to cut rates has been largely removed by the introduction of what is known as "community of interests." The bulk of my hearers are probably not familiar with the geographical situation of all the American railroad companies. So let me paraphrase in terms of English railroad geography, and invite you to imagine the state of things with the North-Western owning the majority of the shares in the Great Central, the Midland owning the bulk of the Great Northern stock, the North-Western and the Midland each owning 20 or 25 per cent. of the Great Eastern stock, while finally the North-Western and the Midland had each two directors on the board of the Great Western. The six systems would all continue as separate companies; competition in facilities would still go on; but the probability of cut-throat competition, either by cutting rates, or by the building of superfluous new lines, would have receded indefinitely far into the background.

(To be continued.)

Some Interesting Dates.

The first teamster who ever turned a wheel in America—and, in fact, introduced not only wheels, but the driving of oxen—was Sebastian de Aparicio, of Spain. He drove ox carts from Vera Cruz to the City of Mexico in 1500.

The first wheels that ever trundled within the limits of what is now the United States were the ox carts which Juan de Anate brought up from Zacatecas in 1596 to colonize New Mexico. The first overland commerce in the United States was that on the Santa Fé trail, 1822 to 1843. This traffic across 800 miles was first by pack train.

The first wagons—25 of them, drawn by horses—made the journey in 1824. Oxen were first used in 1829 and the charge was \$500 a wagon load. Oxen made the round trip between April and November. The great gold rush to California began in 1849. In the summer of that year 1,500 wagons, bound for "California," crossed the Missouri river at St. Joseph in six weeks.

The first mail route west of the Missouri river was a monthly stage line from Independence, Mo., to Salt Lake, 1,200 miles. The first great continental stage line was the "Butterfield Southern Overland Mail." Its route was 2,759 miles from St. Louis to San Francisco, via El Paso, Yuma and Los Angeles. The time was 25 days.

The first coaches started simultaneously from St. Louis and San Francisco, Sept. 15, 1858. Through fare \$100 in gold; letters, 10 cents per half ounce. Seven hundred and fifty men were employed. Russell, Major & Waddell employed 6,250 wagons and 75,000 oxen in freighting across the plains in 1869. Fifteen thousand pounds was a wagon load, with six yokes of oxen to the wagon and 26 wagons to the train.

The pony express, which ran from Independence, Mo., to Frisco, 1,950 miles, made the trip in ten days. It carried mail for \$5 per half ounce. It employed 500 men. The first starter was Harry

*A lecture delivered on Oct. 25, at the School of Economics, University of London.

Roff, who left Sacramento April 23, 1860. The mail was limited to 15 lbs. Ben Holladay's stage line started from Atchison in 1861. It cost \$2,000,000 to build and equip the line. The Government paid Holladay \$1,000,000 a year for carrying the mail.

From Atchison to Placerville, Cal., is 1,913 miles, and the shortest time was 12 days and 2 hours. The fare was \$225. The era of the overland stage line from the river to the coast was eight years. Two thousand seven hundred horses and mules and 100 Concord coaches were used on the main line. At one time Holladay had 5,000 horses and mules and 1,000 coaches on his main line and branches.—*El Dorado (Kan.) Republican.*

Inspector's Report on the Hall Road Collision.

The British Board of Trade has issued its report, made by Lieutenant Colonel Druitt, on the collision of electric trains at Hall Road on the Lancashire & Yorkshire, July 27, when 20 passengers were killed and 47 passengers and the motorman injured. This collision was reported in the *Railroad Gazette* of August 18. The collision was due to a blunder on the part of the signalman, who left a facing point switch set for the side track in the face of an approaching train. When, on trying to clear his signal for the train, he found the lever immovable because of the wrong position of the switch, he assumed that the cause of his difficulty was a failure of the locking apparatus, and thereupon gave the motorman a clear signal by means of a flag. The inspector gives but few facts additional to those already published, but his report is of interest because of some of the comments which he makes. Following are extracts from the report:

"Signalman Boote no doubt made the initial mistake, and I endeavored to get him to say what passed through his mind and caused him to act as he did. He says that when the express was approaching the outer, home signal and he could not get the inner home 'off,' the thought flashed in his mind that he would be fined if he stopped the express. He had never been fined himself for this reason, but had heard that another signalman had been, but he did not know why, beyond that he had stopped an express either through irregular working or some other cause. This thought, and also because he jumped to the conclusion that it was the electric lock on the inner home signal that was preventing it from coming 'off,' apparently induced him to neglect the rule he knew should be carried out, and so he sent on the express without first having a man sent to the signal to give a proper hand signal after first seeing that the facing points were in the right position. Had he done so the express would have been delayed a few minutes, but no collision would have occurred. Motorman Rimmer should have stopped at the signal-box and ascertained what Boote meant by the green flag, and then have gone on slowly to the inner home signal and stopped until he received a proper hand signal to pass it while in the danger position."

"Signalman Boote works eight hours a day and has to attend highway crossing gates which have to be opened on an average less than once in every hour."

"The collision was due to inadvertence in leaving the switch wrong, to disregard of rules, and reckless running, and the only lesson to be learnt from the calamity is the very old one, of the necessity at all times of complying exactly with all rules and regulations, and that punctuality and fast running must always give way to safety requirements."

Discussing criticisms, Lieutenant Colonel Druitt says:

"1. The alleged greater danger of facing points as compared with trailing points on a line on which express trains run. . . . This danger does not exist with the safeguards especially introduced to prevent a signal being lowered to the safety position unless the points are first accurately in position for the line to which the signal refers. In this case both the signalman and the driver broke important rules regarding the manner in which trains are to pass signals which are defective or out of order, and in consequence a collision occurred, but a worse collision can be brought about at trailing points, on the supposition that signalmen and drivers may break rules, as then two trains running at speed could be brought into collision when converging on to a single line. . . . Given the conditions of traffic at Hall Road Station, the facing connections are in my opinion the simplest and quickest way of getting the turnback trains off the down road clear of following trains, and therefore the safest."

"2. The open corridor type of car. This type is coming into use on many railways where steam locomotives are used, and judging by the damage to the cars forming the express train behind the first motor car, which was very slight indeed, there would appear to be no extra danger with this type of car. This collision was a very violent one, the express running at a high speed into a train weighing 170 tons standing with the brakes hard on. The rear end of the first car of the standing train jumped up and so the heavy underframe of the leading car of the express slid along under that of the first car of the standing train, and the top woodwork was all torn away and the two cars completely telescoped one inside the other. The standing train was driven

back a distance of 50 yards with the wheels not revolving but skidding, so that some telescoping was certain to occur whatever type of vehicle was in use.

"This collision also raises the old question of always having an empty carriage next the engine where no luggage compartment is so placed, especially as there is no locomotive on these trains to act as a buffer. The motor cars at each end of these trains have first a motorman's compartment, then a luggage compartment, and then a vestibule with the entrance and exit doors at the sides, amounting in all to a space of 14 feet between the front, and the first portion of the car used for passenger accommodation. I do not consider it practicable to require the motor cars at each end of the train to be run empty. End-on (rear) collisions are as likely to occur as head-on (butting) collisions, so the same precaution would be necessary at the tail as at the head of the train. Much greater security can be obtained by strict observance of rules; and the fact that one driver has recklessly run past a stop signal in the danger position at a very high speed cannot be regarded as one requiring the very onerous conditions to be imposed which would result if no passengers were allowed in the motor cars. Such conditions would quite prevent the use of single steam motor cars, which are now being used in great numbers by several railway companies.

"3. Danger from fire. As soon as the collision occurred a short circuit was set up between the live rail and running rail, probably through a bar falling across them, and so a very large arc was formed at once, and this blew the section circuit breakers at the Formby sub-station. . . . On subsequent examination it was found that there were no signs of fire on any of the cars, except a slight charring of the woodwork underneath the first car of the standing train, and signs of short circuiting between the broken conductors and the ironwork under the car, which caused a certain amount of smoke, but there was no actual fire in any of the carriages, and no one in them could have received any electric shock. . . . Iron bars are supplied to stationmasters, and are also carried on the trains for setting up a short circuit and thereby blowing out the circuit-breakers at the sub-stations in case of emergency. On the occasion in question the station-master should have telephoned at once to have the current cut off, as he saw the large flame of the arc, instead of first going to the scene of the collision.

"So far as can be gathered from the results of this first bad collision on a railway worked by electric traction in this country, there would appear to be no more danger of fire occurring among derailed coaches than on a railway worked by steam.

"4. It may also be mentioned that though there is only one motorman on each electric train, the guards are instructed as to how to stop a train in case of emergency should the motorman be suddenly incapacitated. On electric express trains there is one guard with instructions as soon as the train starts to walk through the train from end to end, count the passengers, and then stand behind the motorman for the remainder of the journey. On electric stopping trains there are two guards, one of whom is always standing behind the motorman when the train is running.

"Looking at the facts connected with the collision, the two most striking results are, first, the absence of any fire among the derailed coaches, the danger from fire being one regarded as especially liable to occur on railways using electric traction and, secondly, the very small amount of damage done to the cars, with the exception of the leading one of each train, due no doubt to the very heavy and stiff underframes.

"Probably the collision would not have been so severe if steam locomotives had been in use, as under the same conditions the acceleration of the express would not have been so rapid; that on the electric trains is stated to be such that a speed of 30 miles an hour can be obtained from rest in a period of 30 seconds, but this, and the quick stopping due to the very powerful brakes in use, form the great advantages of electric traction for a fast and frequent passenger service of trains, and no danger need result therefrom if the ordinary rules for working trains are adhered to."

Big Salaries.

The Chicago *Record-Herald* quotes E. H. Gary as follows, in discussing big salaries:

It is not that the salaries paid to the heads of great business corporations to-day are too large; the real question is whether the right men are drawing the salaries. No man acquainted with the increased responsibilities arising out of modern business methods and conditions will say that \$100,000 is too large a salary for the President of the New York Life Insurance Company or that \$150,000 is an unreasonable salary for the President of the Mutual Life Insurance Company. These corporations handle hundreds of millions of dollars and slight errors of judgment might cost them sums so large as to make such salaries seem trifling by comparison.

The tendency of the business world just now is not to search for men who will take low salaries, but to find men who will deserve high salaries. That is the policy of the Steel Corporation

and it is the policy of all other flourishing business enterprises. The question of the size of the salary is a small matter compared to the question of the right man in the right place.

Take such a man as President Cassatt, of the Pennsylvania, who has had to determine the expenditure of \$150,000,000 within a comparatively short time. Think of the knowledge, experience and good judgment required to deal with problems like that—not only the main policy, but the complex details upon which the main policy must rest. To get at a common sense view of Mr. Cassatt's salary try to imagine what it would cost his company if his policy in spending that \$150,000,000 was unsound; if he overestimates or underestimates future markets, if he spent the money in the wrong direction, if he borrowed the money at the wrong time. Mr. Cassatt is the right man in the right place, and the size of his salary would never induce the owners of the Pennsylvania Railroad to consent to his retirement.

Take a man like Marvin Huggett, President of the Chicago & Northwestern road. Do you think that the stockholders of that enterprise would hesitate to double his salary rather than lose his services?

I meet a good many business men, and this question of salaries is naturally a common subject of discussion. But I do not find that business men, that capitalists, that property owners, complain of salaries. Their one idea is to get hold of the right men.

I know that in my own case money could not tempt me to leave the service of the Steel Corporation. Of course, I am glad to get a salary of \$100,000 a year, but when that salary was first named it pleased me most because it was the largest salary paid to anyone in New York, so far as I knew. To come here I had to give up my life connections, a law practice that was agreeable to me and an income of something like \$75,000 a year.

M. C. B. Association Circular of Inquiry.

The Committee on Height of Brake Staffs has sent out a circular of inquiry to members of the Association asking for information regarding present practice in height of brake staff on box cars. Four questions are asked: (1) What is the maximum height of brake staff (measured from top of rail) permissible on your road? (2) If this limit is fixed by one or two points only, are they sufficiently important to fix the limit for the whole system? (3) What is the height of peak of roof of your standard box car from top of rail? (4) What is your standard diameter of brake wheel? Replies should be sent to the Chairman, J. H. Pennington, S.M.P., Delaware, Susquehanna & Schuylkill, Driftown, Pa.

The committee appointed to prepare specifications and tests for brake-beams for cars of 60,000 lbs., 80,000 lbs. and 100,000 lbs. capacity has sent out a circular containing 15 questions relating to present practice in the design and application of brake-beams. Replies should be sent to R. B. Kendig, Mech. Eng. L. S. & M. S., Cleveland, Ohio.

Manufacturing and Business.

The East Carolina is offering for sale a 35-ton locomotive with 14 in. x 22 in. cylinders and 5,000 lbs. of heavy copper.

William H. Edgar, President of the Dearborn Drug and Chemical Works of Chicago, died on Sunday night last at Hot Springs, Ark.

Mr. Thomas J. Long, Vice-President of the Atlantic, Gulf & Pacific Co., died in New York of pneumonia on November 20, after a short illness. Mr. Long was born in New York City in 1852 and graduated from the Rensselaer Polytechnic Institute of Troy, N. Y., in 1873. He was first employed as an engineer on the Atlantic & Great Western Railroad, and afterward, from 1874 to 1885, he occupied various grades in the Department of Docks in New York City, rising to Assistant to the Engineer in Chief. In 1885 he went to the Morse Bridge Co. of Youngstown, Ohio, and remained with them until the destruction of the works by fire and the dissolution of the company in 1887. He then became general agent of the Union Bridge Co. of New York City and had charge of the construction of several of the largest bridges in the West, notably that across the Ohio river at Cairo, Ill., and the Merchants' Bridge at St. Louis, Mo. From 1896 to 1898 he was engaged in general practice as civil engineer and contractor, and was interested in the enlargement of the Erie Canal. During the next two years he was Vice-President of



Thomas J. Long.

the firm of R. P. & J. H. Staats, doing a general engineering and contracting business, with a specialty of dock and harbor work. In 1900 he became Vice-President of the Atlantic, Gulf & Pacific Co.

The St. Louis office of the Sullivan Machinery Co., Chicago, P. F. Jarvis, Manager, has moved into larger quarters in rooms 1125-A to 1127 Missouri Trust Building.

Bowring & Co., 17 State street, New York, export and import commission agents, have made arrangements through a representative now in the Orient for Cornes & Co., Yokohama, Japan, to act as their agents in Japan. Cornes & Co. have large and fully equipped electrical and engineering departments and are prepared to handle contracts for any kind of machinery and equipment in Japan and the Far East.

The Draper Manufacturing Co., Port Huron, Mich., reports sales of McGrath pneumatic turntable motors and McGrath pneumatic flue welding hammers, described respectively in the *Railroad Gazette* March 24 and May 5, 1905, to the Canadian Pacific, which took a motor for Winnipeg and a hammer for Montreal; Toronto, Hamilton & Buffalo, motor and hammer for Hamilton; Intercolonial of Canada, two hammers for Moncton; Baltimore & Ohio, four additional motors; New York Central, hammer; Erie, hammer for Cleveland; Pennsylvania, motors for Sunbury and Emporium; Richmond, Fredericksburg & Potomac, motor for Richmond; Missouri Pacific, hammer for Ft. Scott.

Iron and Steel.

The United States Steel Corporation is reported to have sold rails in London at about \$31 a ton.

The Lehigh Valley has ordered 18,000 tons of rails from the Carnegie Steel Co. and the Lackawanna Steel Co.

The rolling mills which the Union Pacific is building at Laramie, Wyo., it is said, will start up by the first of next year. Most of the smaller iron required for the Harriman roads will be rolled at the new works.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies, see advertising page 24.)

Engineering Association of the South.

The annual meeting of this Association will be held at Birmingham, Ala., Dec. 15 and 16. The business session will be held on the evening of the 15th. Saturday will be devoted to visiting points of interest in the vicinity of Birmingham, and in the evening there will be the usual banquet.

PERSONAL.

—Mr. R. H. Bowron, who was recently appointed General Superintendent of the Erie, was born in England in 1858. He came to this country at the age of 17 and began railroad work as a telegraph operator on the Tennessee Coal, Iron & Railroad Company's line in 1876. From 1881 to 1884 he was in a railroad supply business; and at the end of that period went to the Alabama Great Southern, and from there to the Mobile & Ohio. In 1887 he was appointed Superintendent of the Chattanooga Union. Thence he went to the Montana Central, and in 1896 was made Superintendent of the Montana division of the Great Northern. In 1897 he was appointed Superintendent of the Willmar and Breckinridge divisions, and in 1898 was transferred to the Cascade division. He went to the St. Louis Southwestern the next year as Superintendent, being promoted to General Superintendent in 1900. In 1903 he was on the Denver & Rio Grande, and in 1904 on the Cincinnati, Hamilton & Dayton. He was promoted to be General Manager of the C. H. & D. in June, 1905, where he remained until his recent appointment.



R. H. Bowron.

—Mr. W. H. Wilson, who was recently appointed Superintendent of Motive Power of the Buffalo, Rochester & Pittsburg, began railroad work, in 1881, as an apprentice in the shops of the Lehigh Valley. In 1886, he went to the Dunmore Iron & Steel Company's locomotive shops, and in 1888 was made foreman of the locomotive de-

partment. Six years later he was made general foreman, and Master Mechanic in 1900. In 1904, he was appointed Master Mechanic of the Susquehanna, Jefferson, Delaware and Tioga divisions of the Erie, where he remained until he took his present position.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—Edward D. Kenna, First Vice-President, has resigned.

Detroit, Toledo & Ironton.—Eugene Zimmerman has been elected President, succeeding F. A. Durban, resigned, and has been also elected a Director, succeeding Samuel Hunt, deceased. John Scoville has been elected a Director, succeeding D. M. Dickinson.

Illinois Central.—H. J. Scheuing, Assistant Superintendent at Evansville, Ind., has been appointed Superintendent of the Nashville division.

Isthmian Canal Commission.—W. G. Tubby, General Store Keeper of the Great Northern, has been appointed Chief of the Division of Materials and Supplies of the Panama Canal, not Superintendent of Construction, as was reported.

Lake Shore & Michigan Southern.—J. J. Bernet, Superintendent of the Eastern Division, has been appointed Assistant General Superintendent, with office at Cleveland, succeeding D. C. Moon, promoted. S. W. Brown, Superintendent of the Western Division, succeeds Mr. Bernet, with office at Buffalo, N. Y. F. H. Wilson, Assistant Superintendent of the Western Division, succeeds Mr. Brown, with office at Chicago. F. M. Smith, Trainmaster of the Michigan Division, succeeds Mr. Wilson.

Missouri Pacific.—B. M. Flippin, Assistant to Vice-President, has been appointed Assistant Freight Traffic Manager, with office at St. Louis. J. C. Lincoln, General Freight Agent of the St. Louis, Iron Mountain & Southern, has been appointed Assistant Freight Traffic Manager of the Missouri Pacific, with office at Kansas City. W. N. Knight has been appointed General Freight Agent, and J. B. Burnett has been appointed Assistant General Freight Agent, both with offices at St. Louis, Mo.

Mobile, Jackson & Kansas City.—C. Henderson, Assistant Secretary and Treasurer, has resigned. D. W. Davis succeeds Mr. Henderson temporarily.

Nashville Terminal.—W. E. Knox, heretofore General Freight Agent of the Atlanta & West Point, has been appointed General Manager of the Nashville Terminal Co.

New York Central & Hudson River.—George H. Daniels, General Passenger Agent, has been appointed to the new position of Manager of the General Advertising department for all the New York Central lines. C. F. Daly, Passenger Traffic Manager of the lines west of Buffalo, has been appointed Passenger Traffic Manager of the lines east of Buffalo, with office at New York. W. J. Lynch, General Passenger Agent of the Cleveland, Cincinnati, Chicago & St. Louis, succeeds Mr. Daly, with office at Chicago.

New York, New Haven & Hartford.—The position of Assistant General Superintendent at New Haven has been abolished.

Southern.—R. B. Pegram has been appointed Assistant General Freight Agent, with office at Nashville, Tenn.

Tidewater.—George Reith, formerly Superintendent of Terminals of the Chicago Great Western at Oelwein, Iowa, has been appointed Superintendent of the Tidewater, with office at Suffolk, Va.

Western Maryland.—H. G. Clark, Manager, has resigned. S. Ennes, Superintendent, has resigned, and is succeeded by J. A. Shepherd, formerly Superintendent of Transportation.

LOCOMOTIVE BUILDING.

The Canadian Northern, it is reported, has ordered 40 locomotives.

The Illinois Central is reported to be in the market for a number of locomotives.

The Minneapolis & St. Louis has ordered eight mogul locomotives from the American Locomotive Co.

The Darien & Western has ordered several locomotives from the Baldwin Works for December delivery.

The Southern, it is reported, has placed an additional order for locomotives with the American Locomotive Co.

The Delaware, Lackawanna & Western, as reported in our issue of November 17, has ordered 50 locomotives from the American Locomotive Co.

The Duluth & Iron Range states that the order for two locomotives from the American Locomotive Co. reported in our issue

of November 17 is incorrect. The only locomotives ordered so far are the 10 which were reported in our issue of October 27 ordered from the Baldwin Works.

The Great Northern, it is reported, is figuring with the American Locomotive Co. for 100 locomotives for delivery in the early spring of 1906.

The Atlantic & Birmingham Construction Company, Waycross, Ga., has ordered 16 ten-wheel locomotives from the Baldwin Works. These locomotives have cylinders 21 in. x 28 in.

The Louisville & Nashville has ordered 30 simple consolidation locomotives from the Rogers Locomotive Works for June, 1906, delivery. These locomotives will weigh 179,000 lbs., with 158,000 lbs. on drivers; cylinders, 21 in. x 28 in.; diameter of driving wheels, 57 in.; straight boiler, with a working steam pressure of 180 lbs.; heating surface, 2,550 sq. ft. The tender will have a tank capacity of 7,000 gallons of water and a coal capacity of 14 tons. The special equipment includes: Westinghouse air-brakes, Gollmar bell ringers, Climax couplers and Leach sanding devices. The above company has also purchased six eight-wheel locomotives from the Northern Pacific with cylinders 17 in. x 24 in.

The Chicago, Rock Island & Pacific, as reported in our issue of November 24, has ordered 50 simple consolidation locomotives from the Baldwin Works. These engines will weigh 201,000 lbs., with 180,000 lbs. on drivers; cylinders, 23 in. x 30 in.; diameter of drivers, 63 in.; wagon top boiler, with a working steam pressure of 185 lbs.; total heating surface, 2,923 sq. ft.; 340 charcoal iron tubes, 2 in. in diameter x 15 ft. 6 in. long; firebox, 107 in. x 67½ in.; grate area, 50 sq. ft. The tender will have a capacity of 7,000 gallons of water and 15 tons of coal. The special equipment includes: Walschaert valve motion, Richardson balanced slide valves, Gollmar bell ringers, Keasby & Mattison boiler lagging, Vanderbilt brake-beams, Major couplers, Hancock injectors, Magnus journal bearings, U. S. piston and valve packings, Hancock safety valve, Leach sanding devices, Nathan bull's-eye sight-feed lubricators, Railway Steel Spring Co.'s springs, Ashcroft steam gages, Standard solid rolled truck and tender wheels, and cast-steel wheel centers.

The Atlantic Coast Line, as reported in our issue of November 17, has ordered 20 simple ten-wheel locomotives from the Baldwin Works. These engines will weigh 155,000 lbs., with 115,000 lbs. on drivers; cylinders, 20 in. x 26 in.; diameter of drivers, 63 in.; straight top wide firebox boiler, with a working steam pressure of 200 lbs.; total heating surface, 2,675 sq. ft.; 236 Shelby steel tubes, 2 in. in diameter x 14 ft. 5 in. long; firebox, 96½ in. x 66 in.; grate area, 44.1 sq. ft. The tender will have a capacity of 6,000 gallons of water and 11 tons of coal. The special equipment includes: Westinghouse friction draft gear, Lobdell chilled cast-iron wheels, I-beam truck bolsters, Lindstrom eccentrics, Westinghouse air-brakes, Keasbey & Mattison sectional magnesia boiler lagging, Diamond special brake-beams, Perfecto brake-shoes, Tower couplers, Dressel headlights, Hancock injectors, Damascus bronze journal bearings, U. S. metallic piston and valve packings, Star safety valves, Watters sanding devices, new Nathan bull's-eye No. 9 sight-feed lubricators, Atlantic Coast Line standard springs, cast-steel wheel centers, Hancock steam valves, Newton fire brick and Richardson balanced slide valves.

CAR BUILDING.

The Chicago City Railway is reported in the market for 200 cars.

The Southern, it is reported, is figuring on about 8,500 freight cars.

The Eureka & Palisade is in the market for 30 ore cars of 30,000 lbs. capacity.

The New York Central & Hudson River is reported to be in the market for 300 passenger cars.

The Fort Worth & Denver City, it is reported, is in the market for additional freight equipment.

The Mobile & Ohio has ordered 1,000 box cars and 200 coal cars from the American Car & Foundry Co.

The Canadian Northern has ordered 1,000 box, stock and baggage cars; 400 flat cars, and 400 passenger cars.

The Chicago, Rock Island & Pacific, it is reported, has under consideration the purchase of additional box cars.

The Louisville Railway Company, Louisville, Ky., has ordered thirty 32-ft. closed cars from the St. Louis Car Co.

The International Railway Company (Electric), Buffalo, it is reported, has just ordered 100 new street cars from the J. G. Brill Co.

The Lake Shore & Michigan Southern, as reported in our issue of November 17, has ordered 1,000 furniture cars from the American Car & Foundry Co.

The St. Louis, Rocky Mountain & Pacific, it is reported, will shortly be in the market for upwards of 1,000 coal cars. Henry Koehler, Jr., St. Louis, Mo., is President.

The Illinois Central, as reported in our issue of November 24, has ordered 1,500 box and refrigerator cars from the American Car & Foundry Co., and 500 box cars from Haskell & Barker.

The New Orleans Railway & Light Company has ordered 30 standard semi-convertible vestibule type cars from the St. Louis Car Co. These cars will be mounted on the St. Louis Car Co.'s trucks.

The Chicago & Eastern Illinois has ordered 2,000 coal cars of 100,000 lbs. capacity, 1,250 National dump cars of 100,000 lbs. capacity from the American Car & Foundry Co., and 25 cabooses from the Mt. Vernon Car Manufacturing Co.

The Atlantic & Birmingham Construction Company, Waycross, Ga., has ordered 1,100 box cars and 300 flat cars from the Atlantic Car & Manufacturing Co., and 16 passenger coaches and six combination baggage, mail and express cars from the American Car & Foundry Co.

The St. Louis & San Francisco has ordered 1,000 coal cars of 100,000 lbs. capacity, 1,700 box cars of 60,000 lbs. capacity, and 300 furniture cars of 60,000 lbs. capacity from the American Car & Foundry Co. The furniture cars will be 40 ft. long x 9 ft. wide x 10 ft. 9 in. high.

The Delaware, Lackawanna & Western, as reported in our issue of November 24, has ordered two passenger cars, 11 express cars, 18 milk cars, 500 steel hopper bottom coal cars and 500 steel gondola cars from Barney & Smith, and 15 passenger cars and three combination cars from the American Car & Foundry Co.

The O. F. Jordan Company, Chicago, has ordered five flat cars of 60,000 lbs. capacity from F. M. Hicks & Co. These cars will be 36 ft. long over all, 7 ft. wide and 4 ft. 2½ in. high, inside measurements. The special equipment will include: Westinghouse air-brakes, National or Tower couplers, Hinson draft rigging and Diamond arch-bar trucks.

The Elgin, Joliet & Eastern, as reported in our issue of November 17, has ordered 500 gondola cars of 100,000 lbs. capacity from the Western Steel Car & Foundry Co. These cars will weigh about 37,000 lbs., and will measure 35 ft. long x 8 ft. 6 in. wide x 8 ft. 8 in. high. The special equipment will include: Simplex bolsters and brake-beams, Westinghouse air-brakes, Harrigan brasses, Janney couplers, Miner draft rigging, Ryan dust guards and Griffin wheels.

The Cleveland, Cincinnati, Chicago & St. Louis has ordered 400 coke cars of 80,000 lbs. capacity from the American Car & Foundry Co. These cars will be 40 ft. long by 8 ft. 8 in. wide by 8 ft. high, all inside measurements. The special equipment will include American Steel Foundries bolsters, Westinghouse air-brakes, Hewitt Mfg. Co.'s brasses, Miner draft rigging, C., C., C. & St. L. standard paint; Railway Steel Spring Co.'s springs, Diamond and C., C., C. & St. L. trucks, and American Car & Foundry Co.'s wheels.

The Minneapolis & St. Louis has ordered two cafe cars and is reported as having ordered one office car from the St. Louis Car Co. It has also ordered six day coaches from the American Car & Foundry Co. for May, 1906, delivery. These cars will be 62 ft. 6 in. long x 9 ft. 8 in. wide over sills and 6 ft. 8 in. high between sills and plate. The special equipment includes: Simplex brake-beams, Fulton brasses, Tower couplers, Hartshorn curtain fixtures, Pantasote curtain material, Pullman standard door fastenings and Railway Steel Spring Co.'s springs.

The Duluth, Missabe & Northern, as reported in our issue of November 24, has ordered 260 steel ore cars of 100,000 lbs. capacity from the Standard Steel Car Co. for May, 1906, delivery. These cars will weigh 32,000 lbs., and will be 24 ft. long over all, 8 ft. 6 in. wide and 9 ft. high, inside measurements. The special equipment will include: Carnegie axles, Simplex bolsters, pressed steel brake-beams, Streeter brake-shoes, Westinghouse air-brakes, Duluth Brass Works brasses, Westinghouse friction draft rigging, Franklin asbestos dust guards, McCord journal boxes, Illinois Steel Co.'s graphite paint, Railway Steel Spring Co.'s springs, Barber trucks and Griffin wheels.

The Lehigh Valley, as reported in our issue of November 17, has ordered 1,000 steel gondola cars and 1,500 box cars from the Standard Steel Car Co., and 500 box cars from the American Car & Foundry Co. The gondolas will be of 100,000 lbs. capacity and will be 40 ft. long x 9 ft. 4 in. wide x 4 ft. 6½ in. high inside. The box cars will be of 30,000 lbs. capacity and will measure 36 ft. long x 8 ft. 6½ in. wide x 8 ft. 1¾ in. high inside. The special equipment for the above cars includes: Lehigh Valley standard

arch-bar trucks, cast-steel truck bolsters, Westinghouse air-brakes, Miner draft rigging, Railway Steel Spring Co.'s springs, Symington journal boxes and dust guards, Magnus Metal Co.'s journal bearings, Winslow's improved roofs and Security doors and door fastenings.

BRIDGE BUILDING.

ATLANTA, GA.—Residents are agitating the question of replacing the present Bell street bridge with a new structure.

CALGARY, ALBERTA.—Work will be commenced at once by the government on a bridge over Bow Marsh to cost \$50,000. W. H. Cushing can give information.

CALUMET, MICH.—The Board of Commissioners of Iron County has authorized the building of a bridge over Brule river on the Crystal Falls-Florence road, to be paid for jointly by Iron and Florence Counties.

CARLISLE, PA.—Bids are wanted by the County Commissioners December 22 for building a bridge over Conodoguinet creek.

DONORA, PA.—A contract has been let to the American Bridge Co. at \$250,000 for building a toll bridge to carry two tracks for electric cars over the Monongahela river at North Charleroi. The structure must be completed by December 1 of next year.

GEORGETOWN, ONT.—The Grand Trunk, it is said, will build a new bridge over the Credit River a quarter of a mile long, to cost about \$200,000.

KANSAS CITY, MO.—Plans for building a reinforced concrete bridge on Gilham road are under consideration by the Park Commissioners. The estimated cost of the structure will be \$40,000.

LEXINGTON, KY.—The voters have authorized the issuance of \$27,000 in bonds for building a viaduct. T. P. O'Neill is City Engineer.

MANITOWOC, WIS.—Bids are wanted December 18 by John S. Unger, City Clerk, for building a steel bridge over the Manitowoc river at Tenth street. The proposed structure is to be 378 ft. between abutments with an 80-ft. draw and 21-ft. roadway with 7-ft. sidewalks.

MILWAUKEE, WIS.—Bids are wanted by the Board of Public Works December 15 for building a section of the superstructure of the Washington avenue viaduct. C. J. Poetsch is Chairman.

MUSCATINE, IOWA.—Bids will be asked early next year by the Commissioners of Drury and Eliza Townships for building three iron bridges. Address Joseph Nussbaum, Muscatine.

MUSCOGEE, FLA.—Bids are wanted January 10 by A. M. McMillan, Clerk of the Board of County Commissioners, Pensacola, Fla., for building a steel bridge over the Perdido river near this place.

NEW YORK, N. Y.—President Rhodes, of the City and County Contract Co., which is building the New York, Westchester & Boston, is reported as saying that he will let contracts for 16 steel bridges on the line of the proposed road between West Farms and the northern boundary of the city of New York.

PORTRAGE, WIS.—The Pan-American Bridge Co., of Newcastle, Ind., has been given a contract at about \$29,291 to build the steel superstructure of the bridge over the Wisconsin river at this place. The work must be completed by May 10 of next year.

The proposed steel bridge to be built over the Wisconsin river at this place will cost between \$50,000 and \$52,000.

SALEM, MASS.—Plans are being made for building an iron bridge, with a draw, to cost \$100,000. Bids may be asked for early next month. W. A. Bates is Chairman of the County Commissioners.

SIOUX FALLS, S. DAK.—Bids are wanted by C. E. Hill, County Auditor, Dec. 8, for building all the bridges that may be needed in Minnehaha County for one year.

TORONTO, ONT.—The City Engineer recommends the building of a swing or rolling lift bridge over the western channel at Queen's Wharf to cost \$200,000.

Other Structures.

CHEYENNE, WYO.—The Union Pacific, it is said, is planning to build a new 20-stall roundhouse here.

CUMBERLAND, MD.—The Baltimore & Ohio, it is said, will put up a new station, with sheds, to cost \$50,000.

GAASSAWAY, W. VA.—The West Virginia Bridge & Construction Co. is putting up a new roundhouse, machine shops and other buildings for the Coal & Coke Railroad. The Mt. Vernon Bridge Co. is furnishing the structural iron for the roundhouse and the West Virginia Bridge Co. the iron for the machine shop building.

JACKSON, TENN.—The Mobile & Ohio has bought a large plot of ground in this city as a site for new yards and for the enlargement of its present shops.

OTTAWA, ONT.—The Grand Trunk Pacific, it is said, will put up a combined station and hotel to cost about \$2,000,000.

SPOKANE, WASH.—The Oregon Railroad & Navigation Co., it is said, will shortly begin work on a new passenger station on the north side of the Spokane river, between Howard and Washington streets, to cost \$50,000.

TEXAS CITY, TEX.—The Gulf, Colorado & Santa Fe, it is said, will build a large refrigerating plant at this place, which is opposite Galveston. The cost of the proposed improvements will be about \$500,000.

TOLEDO, OHIO.—The Lake Shore & Michigan Southern has decided to build large freight house and a union passenger station to replace the present structure. Plans, it is said, have been completed for this work; also for a new roundhouse, new coal docks and a new transfer station.

TOPEKA, KAN.—The Atchison, Topeka & Santa Fe, it is said, is planning to build a large annex to its present building at a cost of about \$40,000.

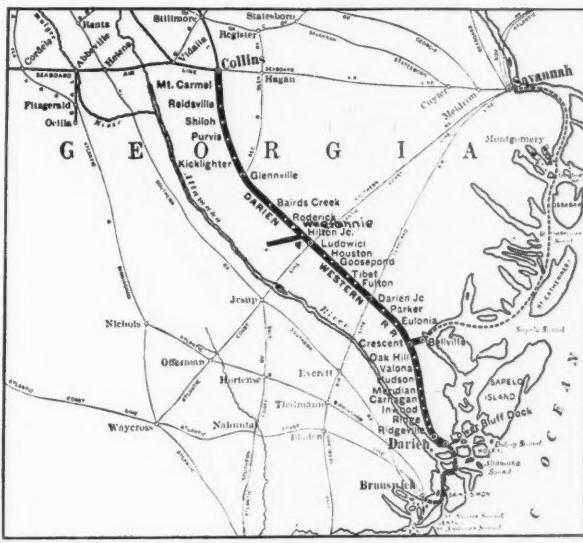
RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ATCHISON, TOPEKA & SANTA FE.—See Eastern Oklahoma below.

BROOKVILLE & MAHONING (PITTSBURG, SHAWMUT & NORTHERN).—This company, which is building a road from Hyde, in Elk County, Pa., where connection will be made with the Pittsburg, Shawmut & Northern, southwest for a distance of 103 miles, is asking bids December 10 for building about 21 miles of its proposed road. The work includes the excavation of about 500,000 cu. yds., 200,000 cu. yds. of borrowed embankment, 20,000 cu. yds. of bridge and culvert masonry, and 700,000 lbs. of 12-in., 18-in. and 24-in. culvert pipe; also 1,900 tons of steel bridges and viaducts. W. W. Henshey is Chief Engineer, Brookville, Pa. (July 7, p. 7.)

DARIEN & WESTERN.—An officer writes that this road, which runs from tidewater at Lower Bluff dock (Darien), in McIntosh County, Ga., northwest to Weefannie, in Liberty County, a distance of 46 miles, has now under construction a line from Weefannie north-



Darien & Western.

west to Glenville, 15 miles. The Reidsville & Southeastern, running from Glenville north to Reidsville, 16 miles, which leases the Collins & Reidsville, seven miles long, will form a part of this company's line, giving a total mileage of 84 miles main line and about six miles of branches. Grading between Weefannie and Glenville is nearly completed and track laying is now in progress. It is expected to have the line in operation early next year. The work is easy, being through a level and sandy section. There will be three trestles from 800 ft. to 1,500 ft. long. The maximum curvature, from Lodowici to Glenville, is 3 deg. The company has docks at Darien (Lower Bluff) and expects to increase its terminal facilities as traffic demands.

CALIFORNIA INLAND EMPIRE.—A number of St. Louis capitalists have organized this company to build a railroad from Boise City,

Idaho, into California, with branches touching the principal mineral, agricultural and grain belts of Washington and Oregon, with a terminus at Sausalito and ferry connection thence to San Francisco. The St. Louis Trust Co. is said to be interested.

CANADIAN NORTHERN.—This company has completed track laying as far as Edmonton, and the main line now extends from Port Arthur, Ont., on Lake Superior, west to Edmonton, Alberta, 1,245 miles.

CHICAGO, BURLINGTON & QUINCY.—This company, it is said, is securing rights of way for building its proposed line from Sterling, Ill., northwest to Savanna, a distance of about 35 miles.

CHICAGO, ROCK ISLAND & PACIFIC.—Vice-President Mudge is reported as saying that the company's Colorado line is to be double tracked for about 291 miles from McFarland, Kan., northwest to Belleville, 105 miles, and from Goodland, Kan., west to Colorado Springs, Colo., 186 miles. This work will complete the laying of heavy rails (85 lbs.) on the Colorado division.

CINCINNATI BELT (ELECTRIC).—Incorporation papers have been filed by a company under this name, to build a railroad from Brighton and Winton place east through the suburbs of Cincinnati and terminating at Redbank. The proposed road is to be a belt line connecting several steam and electric roads which it will intersect. The incorporators include: J. G. Jacobs, J. W. Peurung, O. C. Evans, K. F. Beckhardt and V. Q. Price. The road was originally planned by Peter Eichels and others, of Redbank.

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC (QUEEN & CRES-CENT).—Announcement has been made by General Manager W. A. Garrett that this company proposes to double track its road from Oakdale, Tenn., north to Somerset, Ky., a distance of about 93 miles. This is on the mountain section. About one-third of this work will be carried out during next year, after which the remainder will be double-tracked as soon as practicable. A contract has been given to W. J. Oliver & Co., of Knoxville, for building 12 miles from Pine Knot north to Flat Rock. An additional contract will be let shortly to build the balance of the first 30 miles. The cost of the entire work from Oakdale to Somerset will be about \$1,000,000.

COOK COUNTY & SOUTHERN.—Incorporation has been granted a company under this name, in Illinois, with a capital of \$50,000, to build a railroad from Franklin Park south to Cary, in Cook county. The office of the company will be at Chicago. The incorporators include: James S. Hopkins, Royal Wright and E. M. McKinney, all of Chicago; John M. Peppers of Aurora, and George W. Child of Hinsdale, Ill.

CRESTON & WESTERN.—Articles of incorporation have been filed by this company in Iowa, with a capital of \$250,000, to build a railroad from a point on the Chicago Great Western near Carroll, Iowa, south to Creston, a distance of about 80 miles. The officers are: T. Dufer, President, of Des Moines; Thomas A. Way and Irving W. Keerl, Vice-President and Treasurer, of Mason City, and E. E. Sampson, Treasurer, of Des Moines.

DES MOINES, WINTERSET & CRESTON (ELECTRIC).—This company has just been organized in Iowa to build an electric railroad from a connection with the Des Moines City Railway Co. and the inter-urban railway lines at Valley Junction southwest via Winterset and Macksburg to Creston, Iowa, 44 miles. The officers are: W. D. Skinner, President, and Milo Ward, Secretary, both of Des Moines; S. S. Alexander, of Winterset, Treasurer; A. E. Park, General Manager, and N. E. Coffin, General Counsel, both of Des Moines. (See Construction Record.)

EASTERN OKLAHOMA (A., T. & S. F.).—This company has filed an amendment to its charter in Oklahoma, providing for the building of a railroad from Pauls Valley, Ind. T., southeast for a distance of 20 miles to Sulphur Springs. The company, which is capitalized at \$10,000,000, has among its directors Charles Steele, of New York; E. P. Ripley, W. B. Jansen, of Chicago; F. H. Greer, H. E. Asp, U. C. Guss and W. H. Merten, of Guthrie.

GRAND TRUNK.—Plans, it is said, have been completed by this company for elevating its tracks in London, Ont., at a cost of about \$1,000,000.

GREAT NORTHERN.—This company, it is said, will build an extension from Armington to Billings, Mont., a distance of 200 miles, connecting Billings with Great Falls and forming a link between the Northern Pacific and the Burlington on the south and the Great Northern on the north.

JOLIET & SOUTHERN TRACTION.—Incorporation has been granted to this company in Illinois, with a capital of \$10,000, to build a railroad from Joliet, Will County, Ill., southwest through Will, Grundy and Livingston Counties to a point in Dwight County. The office of the company will be at Joliet. The first board of directors includes: H. A. Fisher, F. E. Fisher, L. D. Fisher, F. E. Stoddard and J. A. Jarvis, all of Joliet.

KANSAS CITY SOUTHERN.—An officer writes that a contract has been let to W. O. Wilbourne, of Edgerly, La., for building the line from Lockport Junction, on the Lake Charles branch, southwest to Union Sulphur Mine, a distance of about six miles. Grading has not yet been commenced. The maximum grades will be $\frac{1}{2}$ per cent. and maximum curvature 7.3 deg. (November 10, p. 149.)

KENTUCKY ROADS (ELECTRIC).—Application has been made to the Montgomery Fiscal Court by John T. Collins, W. A. Thomason, of North Middletown, and others to build an electric railroad from Paris, Ky., to Mt. Sterling, 30 miles. Work is to be commenced at once, it is said.

KLONDIKE MINES RAILROAD.—This company, which was granted a charter in 1899 to build a railroad from Dawson to Stewart river crossing, 84 miles, built five miles and graded 10 additional miles, but was unable to continue the work for lack of funds; but it is said that the project is now revived. T. W. O'Brien, of Dawson City, is negotiating to secure the necessary financial backing to complete the road.

LOUISIANA EAST & WEST.—A contract is reported let by this company to J. W. Dickinson for grading the first 10 miles of its proposed extension from its northern terminus at Bunkie, La. (October 20, p. 127.)

MANILA & SOUTHWESTERN.—An officer writes that grading work is now under way by D. A. Smith & Sons, of Manila, Ark., for a distance of 65 miles. The line is from Wynne, Cross County, Ark., northeast to Manila, Mississippi County. The proposed road will run through a level and heavily timbered district. About two miles of trestle will be required at the St. Francis river, also a drawbridge. R. L. Williford, of Manila, is President, and William Kerr is Chief Engineer, Jonesboro, Ark. (November 3, p. 143.)

MARION, MATTHEWS & MUNCIE (ELECTRIC).—Articles of incorporation have been filed by a company under this name in Indianapolis to build an electric railroad from Marion southeast to Matthews, Ind., 16 miles, and from the latter place to Muncie, Ind., an additional 16 miles. Such a road would parallel the Chicago, Indiana & Eastern from Matthews to Muncie. The incorporation includes: Samuel Ecker, Jr., of Matthews, and George G. King, William W. Adams, W. T. Nelson and W. S. Whitney.

MISSOURI, KANSAS & TEXAS.—Surveys, it is said, are being made by this company for building an extension from Mineral, Kan., to Pittsburg, connecting at Mineral with the Parsons-Joplin branch. The extension will give the M. K. & T. connection with the coal fields around Pittsburg and an entrance into the city.

MOREHEAD & NORTH FORK.—Incorporation has been granted to a company under this name in New Jersey with a capital of \$500,000 to build a railroad in Kentucky. The incorporators include: William McCormick, of Philadelphia; John W. Wrigley, of Clearfield, Pa., and Lewis Starr, of Woodbury, N. J.

NEW YORK, SUSQUEHANNA & WESTERN (ERIE).—A contract has been given to Lesher & Wagner, of Jersey City, to build an extension of the Edgewater & Fort Lee branch. It runs from the western portal of the Bergen Hill tunnel north for a distance of one mile. A contract for a further extension of two miles will be let next spring.

NORTHERN PACIFIC.—This company is to build a new short line from Washburn, Wis., to connect with the main line at Omaha Junction, about nine miles from Washburn. The company already has a line to that city, having bought the old "Battle Axe" road some years ago; but the grades are so steep that this line is to be built over a more favorable route.

OKLAHOMA CITY, LEXINGTON & SULPHUR SPRINGS (ELECTRIC).—This company, it is said, proposes to build an electric railroad from Davis, Ind. Ter., northward, crossing the South Canadian river at Redbank Crossing, five miles south of Lexington, thence north through Lexington to Oklahoma City, Ind. Ter., about 80 miles. A contract is reported let to the Lovejoy Construction Co. for building the first 11 miles, to be completed during the present year. Chief Engineer Guy McGuire is quoted as saying that work will be under way next month on the entire line. The work includes the building of a steel bridge over the South Canadian river about 3,000 ft. (See Oklahoma Interurban, July 7, p. 7.)

OREGON ROADS.—The City Council of Portland, Ore., is considering an application for a franchise by a company which proposes to build an electric railroad from Portland south through the Willamette valley and to the Coos Bay region.

A project is under way to build a railroad from Portland northwest via Nehalem to Tillamook, on the coast, about 80 miles. This project, which has been talked of for several months, is awaiting financial backing. It is said that new interests have now taken hold of it and that grading on the proposed route will be begun soon.

PENNSYLVANIA LINES.—The Pennsylvania, it is said, is planning

to double track the Cleveland & Pittsburgh from Martins Ferry to Bellaire, seven miles.

PORT ANGELES & OLYMPIA.—A charter has been granted a company under this name in Washington with a capital of \$4,000,000 to build a railroad from Victoria, B. C., to the northwest corner of Vancouver Island, a distance of about 270 miles. Connection is to be made on the south end with the American shore at Port Angeles by ferry. Lester Turner, Jacob Furth, W. D. Hopkins, A. A. Arthur, all of New York, and M. J. Carrigan, of Port Angeles, are interested.

SAN PEDRO, LOS ANGELES & SALT LAKE.—A contract has been given by this company to the Utah Construction Co. for building 3 or 4 miles of tracks to the smelters at Garfield, Utah.

YELLOWSTONE PARK RAILROAD.—Incorporation has been granted to a company in Montana with a capital of \$3,000,000 to build a railroad from Bridger, Mont., on the Northern Pacific, southwest to Cooke, in the northwest corner of the National Park. Frank A. Hall is President of the company. This project has no connection with the company incorporated under the same name by Union Pacific interests.

RAILROAD CORPORATION NEWS.

CHICAGO, MILWAUKEE & ST. PAUL.—At a special meeting of the directors held in New York City on Tuesday, an extension from Evarts, South Dakota, the farthest western point reached by the St. Paul, to the Pacific coast at Tacoma and Seattle was authorized. The route will probably be substantially that reported last week in the Railroad Construction columns of the *Railroad Gazette*—from Evarts to Butte, Montana, thence through the Clearwater country to Lewiston, Idaho, and across the southeastern corner of the state of Washington to Wallula on the Columbia river just south of Pasco. Wallula is to be the eastern terminus of the recently incorporated Pacific Railroad, whose President is the late General Manager of the St. Paul. The air-line distance from Evarts to Puget Sound is something over 1,000 miles; the new line should be from 1,200 to 1,400 miles long. There is \$25,000,000 C. M. & St. P. common stock, authorized on October 4, 1902, unissued.

INTERCOLONIAL.—The gross earnings of this company for the three months ended September 30 were \$1,995,630 and the operating expenses were \$2,072,447. In the month of September, however, the earnings were greater than the operating expenses, the figures being \$686,271 and \$661,612 respectively.

NORTHERN PACIFIC.—The report for the year ended June 30, 1905, shows that the average mileage operated during the year was 5,315, an increase of 103 miles. The gross earnings were \$50,- 722,886, an increase of \$4,198,311, the average per mile being \$9,543, an increase of \$702. The operating ratio was 53 per cent., an increase of 1 per cent., the operating expenses being \$26,808,759, an increase of \$2,574,216. The surplus after dividends was \$6,276,242, an increase of \$1,896,920, making the total balance to the credit of profit and loss \$14,381,219.

PANAMA.—The New York Stock Exchange has listed \$607,000 additional first-mortgage 4½ per cent. bonds, making the total amount listed \$2,879,000.

PHILADELPHIA COMPANY.—It is reported that a new holding company will be formed to purchase control of this company by exchanging \$37.50 in collateral trust bonds secured on the Philadelphia Co. and \$20 in common stock of the new company for each \$50 share of the \$28,953,029 common stock of the Philadelphia Co. The Philadelphia Co. owns 365 miles of street railways in Allegheny County, Pa.; it also controls the greater part of the natural gas in that county and owns many oil wells in that region. It is stated that the United Railways Investment Co., of San Francisco, which owns stock of the United Railroads of San Francisco, is behind the new company. Ladenburg, Thalmann & Co., of New York, are interested in the United Railways Investment Co., which has a capital stock of \$25,000,000 outstanding.

ST. LOUIS & SAN FRANCISCO.—In the quarter ended September 30, the gross earnings of this company were \$10,251,659 and the net earnings \$3,717,876. The surplus after charges was \$530,637.

SOUTHERN INDIANA.—During the year ended June 30, there were 197 miles of road operated, an increase of 31 miles. The gross earnings were \$1,380,955, an increase of \$87,374. The operating expenses were \$798,273, an increase of \$59,455, leaving net earnings of \$582,682, an increase of \$27,919. The surplus after charges was \$206,118.

WESTERN MARYLAND.—The New York Stock Exchange has listed \$10,000 general lien and convertible 4 per cent. bonds, \$15,685,400 capital stock and an additional \$1,270,000 first-mortgage 4 per cent. bonds, making the total amount of the latter bonds outstanding \$33,194,000. Of these bonds, \$900,000 were used to pay for the extension from Cherry Run to Cumberland.

